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Forest fire losses in Canada.

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FOREST RESEARCH BRANCH

FOREST FIRE LOSSES IN CANADA 1962

by

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1963

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FOREST FIRE LOSSES IN CANADA

1962

INTRODUCTION

Through the co-operation of the provincial and federal forest protection agencies it has become possible to add several new categories of forest fire loss statistics to this annual publication. Statistics for both total numbers of fires and areas burned, stratified into five fire-size classes which have been included for the first time, Table 1. A new forest fire cause classification has been introduced in Table 2. The new cause classes were designed to be jointly exhaustive and mutually exclusive. The classes previously used were not mutually exclusive. To complement statistics of numbers of fires occurring by months, Table 4, a new series of figures listing areas burned by months has been introduced in Table 5.

One minor change in nomenclature has been made. In Table 1, cost of "Capital, Maintenance and Overhead" was formerly known as "Other Fire Protection Costs". As in the past, this category includes costs of detection, prevention and presuppression. Except for the above-mentioned modifications, this annual statement of fire loss statistics is presented in the usual way in Tables 1 to 6.

LOSSES IN 1962

Interpretation of the 1962 fire losses is left largely to the reader. In general, there is no doubt that losses suffered in 1962 were comparatively light. The total area burned was only some 40 per cent of the average for the previous 10 years and was less than 50 per cent of the estimated average over the previous 20 years. Only twice since 1949 have smaller volumes of saw timber been destroyed, in 1954 and 1957. Losses of pulpwood-sized timber were less than one-half the average annual losses.

As indicated in Figure 1, the total number of fires reported was again slightly above average. Possibly fire prevention programs require some reinforcing to keep pace with the ever increasing use of the forests by the public. The problems of fire prevention are considered in some detail below.

The comparison of fire loss statistics for one year against average figures for a 10-year period can result in seriously misleading conclusions. Fire losses vary so widely from year to year that averages based on periods as short as 10 years may not yield particularly good indications of long-run average experiences. In some instances, 10-year averages based on the period 1952-61, shown in Table 1, are markedly different from averages based on the period 1951-60. The differences result from the extremely heavy losses suffered in 1961. For example, in 1961 the areas of merchantable timber and non-forested land burned were each nearly the same as the total areas burned in each of these categories over the previous 10 years. The volume of saw timber destroyed in 1961 alone was nearly twice the total destroyed over the previous 10 years. Monetary damages in 1961 were more than the total recorded from 1951 to 1960. Certainly, averages should be based on more extended periods to be of much use. It has been necessary to continue use of 10-year averages since data for many factors are not available for much more extended periods. Some classes of statistics are available only for even shorter periods.

In spite of the great improvements in fire control techniques over the years, the range of losses has been wide, and largely dictated by weather conditions. Fire occurrence in recent years in the provinces has ranged from 2,952 in

1954 to 8,438 in 1961. The total area burned has varied from 264,295 acres in 1954 to 8,459,973 acres in 1961. Volumes of saw timber destroyed have fluctuated from 25,580 M fbm in 1957 to 9,362,970 M fbm in 1961. Pulpwood losses have varied similarly, from 438,000 cords in 1957 to 8,883,829 in 1961.

The most questionable statistics in Table 1 are those for values destroyed. Only damages to timber values are considered, and at that only those damages suffered by the timber owners. Losses incurred by lessees, damages to site, recreational values, etc., are unknown. Unfortunately, even the figures recorded for damages to timber may be quite unrealistic. This was particularly true for 1961 when much of the timber destroyed was in areas inaccessible for logging; yet values were sometimes assigned as if these areas were currently being exploited. The appraisal of forest values is a complex and poorly understood subject. Although investigations are under way to provide some basis on which appraisals may be standardized, few guidelines suitable to Canadian conditions are currently available.

While most provinces suffered fire losses of record proportions in 1961, the area burned in the Province of Quebec was less than 40 per cent of average, even though the number of fires was close to average. Nature evened the score in 1962, as shown in Table 6. More than half the total area burned and two-thirds of the monetary damage suffered in Canada in 1962 occurred in Quebec.

ANALYSIS OF SOME RECENT TRENDS

One of the more disturbing features revealed by forest fire loss statistics over the years, has been the steadily increasing costs of fire control. Suppression costs fluctuate widely from year to year, of course, because of their direct dependence upon the actual fire loads. But the largest component of fire control costs, the costs of prevention, detection and presuppression are only indirectly related to fire experience, yet, these costs have been rising steadily. From 1947 to 1961 annual costs have more than tripled from an estimated \$7.8 million to \$27.5 million. Considerable degree of inflation has occurred during this 15-year period so that the indicated increase in expenditures exaggerates the real trend of expansion.

To identify the real growth trend of fire prevention, detection and presuppression activities in Canada, it was necessary to deflate the annual market value totals to constant dollar estimates. Such estimates, valued in terms of a base year, would represent the implicit quantities entailed with expenditures for capital investment, maintenance and overhead over the years. Since fire control is such a specialized segment of the economy however, there is no current price index particularly suitable for use in the deflation process. The implicit price index for government expenditures on goods and services (Dominion Bureau of Statistics 1958, 1963) was used as most representative, but with reservations. The trend of fire control expenditures is depicted in Figure 2. From the deflated annual costs it would appear that growth of capital, maintenance and overhead expenditures has been something in the order of 80 per cent over the 15 years, 1947 to 1961. These figures, containing elements for maintenance and repair of facilities and equipment, represent gross rather than nett growth. Unfortunately, insufficient data are available to permit portrayal of nett growth of capital and manpower.

Although total capital, maintenance and overhead expenditures have grown considerably in recent years, the intensification of expenditures has not been as great when considered on a per unit area protected basis. From 1947 to 1961 the area under protection in the provinces, including estimates for the Island of Newfoundland prior to its confederation, increased 54 per cent, from 824,706 to

Figure 1
FOREST FIRE OCCURRENCE
(Excluding Yukon and Northwest Territories)

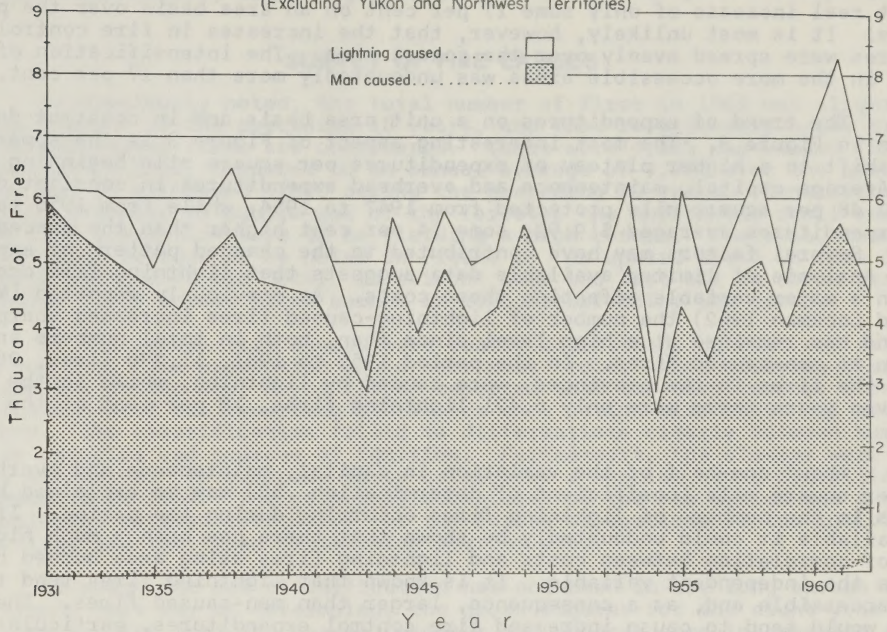
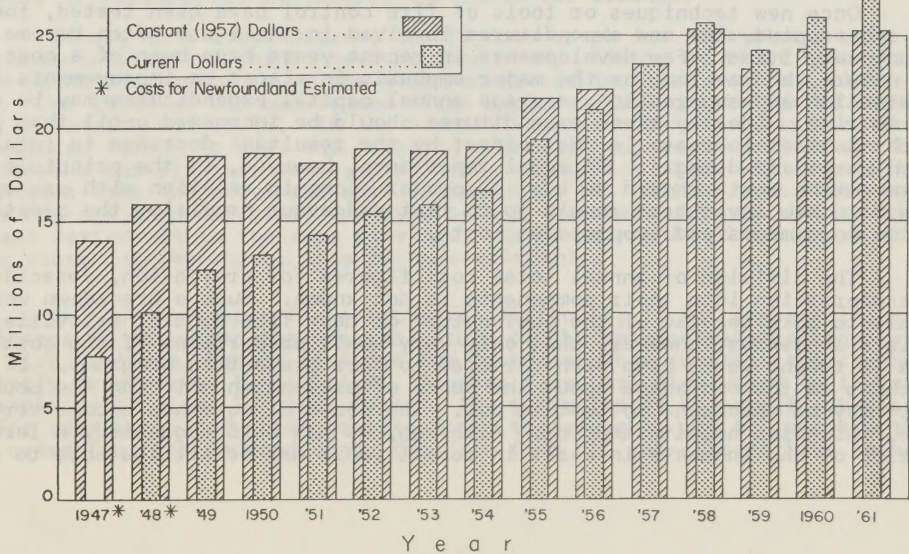


Figure 2
CAPITAL, MAINTENANCE and OVERHEAD COSTS
(Excluding Yukon and Northwest Territories)



1,266,641 square miles; consequently, the increase in expenditures has shown an apparent real increase of only some 17 per cent on an area basis over the past 15 years. It is most unlikely, however, that the increases in fire control expenditures were spread evenly over the forest area. The intensification of fire control in the more accessible areas was undoubtedly more than 17 per cent.

The trend of expenditures on a unit area basis and in constant dollars is shown in Figure 3. The most interesting aspect of Figure 3 is the apparent sudden shift to a higher plateau of expenditures per square mile beginning in 1955. Average capital, maintenance and overhead expenditures in constant dollars were \$17.48 per square mile protected from 1947 to 1954, while from 1955 to 1961 these expenditures averaged \$19.92, some 14 per cent higher than the preceding period. Several factors may have contributed to the changed pattern of expenditures. Analysis of limited available data suggests that lightning fire occurrence has been a major variable affecting these costs. As previously reported (Mactavish and Lockman 1962) the number of lightning-caused fires increased sharply in 1955, and has remained at a high level since then, both in total numbers and in relation to man-caused fires. In the period 1955 to 1961, 11,276 fires, 26 per cent of the fires in the provinces, were caused by lightning, while in the preceding seven years there were only 6,421 lightning fires, 18 per cent of the total number.

About one-half of the variation in capital, maintenance and overhead costs per square mile (coefficient of determination .58) may be explained by variations in the numbers of lightning fires occurring during the period. If data were available it could undoubtedly be shown that there has been a much higher degree of correlation between costs and lightning fires using area burned by these fires as the independent variable. It is known that lightning fires tend to be more inaccessible and, as a consequence, larger than man-caused fires. These two factors would tend to cause increased fire control expenditures, particularly those related to capital equipment and transportation. It is probable that the sudden increase in lightning fires triggered the rapid growth in the use of aircraft. From 1957 to 1961 expenditures by the provinces for chartered aircraft alone rose nearly 525 per cent. In addition, a number of agencies established or added to their own fleets of planes. Because of planning and budgetary restraints, the full impact of a heavy fire load in one year may not appear in capital expenditure accounts until the succeeding year, thus reducing the apparent direct correlation between expenditures and fire loads.

Once new techniques or tools of fire control have been tested, found useful and adopted, the new expenditures involved in their use often become standard budgetary items. Few developments in recent years have been of a cost-reducing nature, and as long as the major emphasis is placed on improvements for fire detection and suppression, average annual capital expenditures may be expected to rise. Ideally these expenditures should be increased until that point at which the last increase is just offset by the resultant decrease in total suppression costs and damages. Of equal importance, however, is the principle that fire prevention costs should be kept in proper economic relation with presuppression costs. New investment should go to that endeavour promising the greatest reduction in damages and suppression costs.

The division of annual total cost figures for prevention, detection and presuppression into their components is not known. Such a breakdown would be difficult to make because of the dual nature of many fire control activities. There is a consensus, however, that only very small proportions of the cost increases in recent years have been directed to fire prevention programs. If there is anything to the old adage about the ounce of prevention matching the pound of cure, it may be opportune to test it out. The pound of cure has become very expensive, inflation notwithstanding. Although, as has been suggested, a large proportion of the increase in costs in recent years may be attributable to una-

voidable lightning fires, the fact remains that about 75 per cent of all fires result from human error, something preventable.

SURVEY OF FIRE CAUSES

As previously noted, the total number of fires in 1962 was slightly above the average of the preceding 10 years, and this relationship holds true when only man-caused fires are considered. There were 4,585 man-caused fires in the provinces in 1962, compared to an annual average of 4,370 over the preceding 10 years, and an estimated 4,380 during the preceding 20 years. Considering the astonishing increase in public use of the forests, the apparently small sums allocated to fire prevention seem to be yielding a high return. There is, however, one distressing feature to be noted in Figure 1. An upward trend in fire occurrence, both man-caused and total, is evident over the last six or seven years. An estimated 7,300 forest fires burned in 1963, reinforcing the trend.

If the actual fire causes were really understood, current and future efforts put into fire prevention would bear more fruit. When studying fire causes about a decade ago, Doyle (1951) reported that the then current fire cause classification used for reporting statistics on a nation-wide basis was not satisfactory. The classification failed to differentiate clearly between human causative agencies and sources of ignition. Furthermore, the classes were not mutually exclusive. To overcome these criticisms a special cause classification was introduced in 1954. The principal advantages of the new system are a clear differentiation between categories for the forest occupations of the individuals causing fires and the types of ignition sources used.

Although the new classification has not been in use long enough to indicate trends that may be developing, the gross figures for the eight-year period permit some insight into the overall problem and suggest some interesting avenues for fire prevention programs. The figures gathered from eight provinces from 1954 to 1961 are summarized in the Table 7. Unfortunately, British Columbia was unable to supply the necessary statistics and figures from Prince Edward Island are not included since that province does not normally report fire loss statistics. The headings in Table 7 are not identical to those of the original classification. The original occupation classification listed "farmers" and "settlers" separately. On analyzing the data it became apparent that these occupation classes had been interpreted differently across the country. It was necessary, therefore, to combine the statistics for these two classes.

Since, to a large degree, the figures speak for themselves, only a few of the more interesting points need be discussed. First, as might be expected, smoking materials proved to be the major source of ignition over the eight-year period. One third of all man-caused fires reported during this period were ascribed to smoking materials. In the original ignition source classification that the provinces agreed to use, the "smoking materials" class was subdivided into the following sub-classes: match; pipe heel; cigarette; cigar and unspecified. When returns from the provinces were compared, it was obvious that these sub-classes had not been uniformly employed by all agencies. Use of the sub-classes sometimes varied within the same province. Considering the difficulties involved in fire cause determination, this is understandable.

In many instances it is extremely difficult, if not impossible, for an investigator to determine the precise nature of the smoking material involved in forest fire ignition. Except in those few instances when culprits are caught and admittedly reconstruct their crimes, or when fires are discovered in their incipient stages by an alert Sherlock Holmes, the selection of a correct sub-class calls for remarkable deductive powers. Since there was no way to separate the proved cases from the deduced ones, the data from all sub-classes have been com-

ANALYSIS OF MAN-CAUSED FOREST FIRES, 1954-1961

Source of Ignition	Occupation of Individuals Responsible															
	Farmers & Settlers	Summer Residents	Tourists	Hunters	Fishermen	Berry Pickers	Trappers	Prospectors	Miners	Forest Workers	Saw Millers	Public Projects	Railroaders	Military	Miscellaneous	Unknown
Smoking materials	649	176	1514	532	1075	958	51	37	59	395	47	148	292	17	1036	1025
Campfire	68	192	578	551	1053	399	200	64	32	179	12	59	2	7	418	539
Incendiary	272	9	11	10	17	15	28	-	1	25	2	1	1	1	84	872
Chimney spark	202	30	56	15	7	-	24	6	11	7	3	-	-	-	10	371
Explosives	2	1	-	-	-	-	-	3	4	6	-	2	10	25	9	5
Power saw	32	10	3	-	-	-	3	4	-	264	4	7	2	-	1	2
Burning building	97	22	2	2	6	-	-	1	-	9	2	2	1	-	55	81
Dump	23	3	3	-	1	-	-	-	-	4	-	-	-	-	9	24
Slash fire - with permit	504	8	2	-	-	-	-	-	13	28	3	156	8	-	2	2
Slash fire - no permit	656	21	-	-	-	-	-	-	20	29	3	11	-	-	1	36
Land clearing	769	13	-	-	1	16	-	-	1	11	1	80	8	3	11	29
Burning debris	676	116	34	1	5	3	1	4	12	64	70	104	21	2	58	73
Burning rt. of way	3	-	-	-	-	3	-	-	6	14	-	106	198	-	5	8
Locomotive	-	-	-	-	-	-	-	-	-	-	-	-	1605	-	7	9
Other engine	63	-	44	5	-	16	-	-	3	51	18	36	52	-	4	38
Miscellaneous	117	31	15	12	37	16	2	4	41	46	57	90	26	99	77	686
Unknown	58	6	269	24	148	94	3	4	1	60	3	31	40	7	53	1779
Total	4191	638	2532	1152	2351	1522	326	125	167	1187	214	805	2330	90	1852	4609
Per Cent of Total	17.4	2.6	10.5	4.8	9.8	6.3	1.4	0.5	0.7	4.9	0.9	3.3	9.7	0.4	7.7	19.1
																100.0

bined and are presented in the above Table under the general heading "smoking materials".

Critics may be quick to claim that the blue smoke of suspicion also hangs over the combined figures. Applying logic it could be argued that if indeed the once glowing cigarette butt had disappeared, making it impossible to ascribe a fire to the cigarette sub-class, how then could the fire be ascribed to smoking materials? More condemning evidence comes from California where a recent study reported by Taylor (1960) indicated that field officers were "positive" only four per cent of the times that they reported fires as caused by "smokers".

In spite of these criticisms it is assumed that the total figures given for smoking materials are at least fairly accurate, if only because of the inclusive nature of this category. Most of the other categories of ignition source are straightforward, and a satisfactory degree of reliance may be placed on the statistics for them. If it can be assumed that the "unknown" category was used correctly, then by elimination, the figures for "smoking materials" would be reasonable estimates.

The statistics on fires started by smoking materials at least provide some rough guidelines for prevention activities. Tourists, fishermen, children and hunters accounted for more than half of these fires. Nearly 1,000 smoking material fires in the "miscellaneous" occupation class were actually reported caused by children. The majority of these were caused by children playing with

matches. Since some provinces did not segregate the statistics for fires caused by children, the total for the eight years was undoubtedly more than 1,000.

Obviously there is a dire need for research to determine the specific causes of fires charged to smoking materials. This catch-all category hides several specific sources of ignition involving specific groups of people. If fully documented, these causes might be susceptible to control and possibly to elimination through the instigation of specialized fire prevention programs. If, for example, it were determined that the principal ignition source of smokers' fires was actually matches, as suspected in some quarters, a number of prevention programs would suggest themselves. The development and use of improved anti-glow compounds by the match manufacturers would be one. A program to issue free, slogan bearing, cigarette lighters to forest travellers would be another. Until specific causes are known, prevention campaigns must remain hit-or-miss programs.

An unjustifiably large proportion of forest fires have resulted from fires lit intentionally for useful purposes. At least 35 per cent of all man-caused fires resulted from inadequate control of intentional fires. More campfires escaped and became forest fires than any other type of intentional fire. Next to smoking materials, campfires were the most important source of man-caused fires during the study period, accounting for 18 per cent of the total. The importance of this cause varied considerably from region to region. In the Atlantic region, only 6 per cent of the man-caused fires were charged to campfires. In the central region, Quebec and Ontario, campfires accounted for 19 per cent, or about three times the proportion in the Atlantic region. In the prairie provinces, campfires were five times as important as in the Atlantic region, accounting for 30 per cent of the fires reported for the region.

Explanations for the increasing importance of campfires as a cause of forest fires from east to west in the country are lacking. Since insufficient field research has been done on the subject, one can only speculate as to the reasons. Possibly the apparent trend merely reflects differences in reporting methods. On the other hand it could reflect distinct differences in habit among the forest travellers of the three regions. It was only in the prairie provinces, for instance, that trappers' campfires were found to be a serious cause of forest fires. Of all the escaped trappers' fires reported, 75 per cent were in the prairie provinces. Again, in the prairie provinces 16 per cent of the forest fires resulting from campfires were charged to Indians, while Indians were not singled out as an important cause in the other provinces. Possibly these factors contributed to a higher proportion of escaped campfires in the western provinces as compared to other regions.

More fishermen's campfires became forest fires than those of any other group. This occurred in all three regions. Fishermen accounted for almost one-quarter of all escaped campfires reported, and these made up almost half of all forest fires charged to fishermen. This may be a situation where a country-wide prevention program tailored especially for a specific known problem could be fruitfully undertaken.

Incendiary fires were numerous during the study period even though it was a period of relative prosperity. The majority of incendiary fires were reported from the prairie provinces where they accounted for 11 per cent of all man-caused fires. It is interesting to note that the identities of the culprits were only determined 35 per cent of the time.

The other categories of intentional burning, besides campfires and incendiary fires, accounted for at least 17 per cent of all reported man-caused fires. Farmers and settlers proved to be the most troublesome group responsible for these fires, accounting for 64 per cent of the total. Exclusive of the situation in British Columbia, the "farmers and settlers" group accounted for 77

per cent of all escaped slash fires. The problem with farmers and settlers was most severe in the prairie region and least important in the Atlantic region, but even in the latter, 60 per cent of all escaped slash fires were charged to this group.

The majority of wildfires resulting from land clearing fires, 55 per cent, occurred in the prairie region, and 91 per cent of these were attributed to farmers and settlers. The majority of escaped land clearing fires in the central and Atlantic regions were also charged to this group. Although forest fires resulting from burning debris were charged to a greater number of occupations, farmers and settlers were still responsible for more than half the total. Research into the reasons for fires escaping burns conducted by farmers and settlers should prove fruitful. Application of research findings should sharply reduce the likelihood of future escapes.

There are two varieties of fire prevention programs. One is the generalized program in the form of regulations or propaganda aimed at broad segments of the population. Besides keeping the public generally fire conscious such programs, exemplified by the slogan "Prevent Forest Fires", are the appropriate tools for combatting those nebulous fire causes about which little is actually known. The second, and more desirable, type of prevention program is that directed at specific groups of people and specific sources of ignition. This sort of program can be undertaken adequately only after a particular fire cause has become understood through practical research in the field. Perception of the problem would permit dealing with it through the people involved, the sources of ignition used, or both. The successes over the years in reducing the number of fires caused by railroad operations serve as an example of this type of prevention activity. A recent development here has been the experimental introduction of a new, composition brake shoe. Use of the new shoes should reduce fire occurrence by sharply reducing or eliminating the throwing of molten metal particles when brakes are applied.

Recently, considerable attention has been paid to finding methods to reduce the numbers of "power saw" fires. Although only a small proportion of the total number of fires are attributable to saws, this cause is potentially very dangerous. Use of power saws by forest workers has multiplied in recent years, and they are normally used in and adjacent to potentially hazardous slash areas. Bennett (1959) reviewed available literature on power saw fires and has since made annual surveys attempting to determine the actual sources of ignition involved in these fires. He found that responsibility lay with both the saws and the operators. Power saw manufacturers have made modifications to their products in an attempt to reduce the risks associated with their use (Power Saw Manufacturers Assoc. 1961). Maintenance and safety manuals have been prepared especially for power saw operators by interested agencies. It is through this type of concerted prevention research and corrective action that specific fire causes may be reduced to minimal importance.

SUMMARY

In 1962 a slightly greater than average number of fires burned over a considerably smaller than average acreage. Quebec suffered the heaviest losses.

Total costs of prevention and presuppression rose about 80 per cent in real terms from 1947 to 1961. Costs per square mile protected increased about 17 per cent.

There appears to have been a close relationship between lightning fire loads and expenditures for capital, maintenance and overhead.

"Smoking materials" have been the principal source of forest fire ignition in recent years, accounting for one-third of all man-caused fires reported by eight provinces from 1954 to 1961. Escaped intentional fires, excepting those of incendiary origin, accounted for more than one-third of all man-caused fires reported.

Research is required to pin down actual sources of ignition and human responsibility before prevention programs can be advanced from the current broad hit-or-miss bases to more sophisticated approaches.

Figure 3
CAPITAL, MAINTENANCE and OVERHEAD COSTS
PER SQUARE MILE PROTECTED
(Excluding Yukon and Northwest Territories)

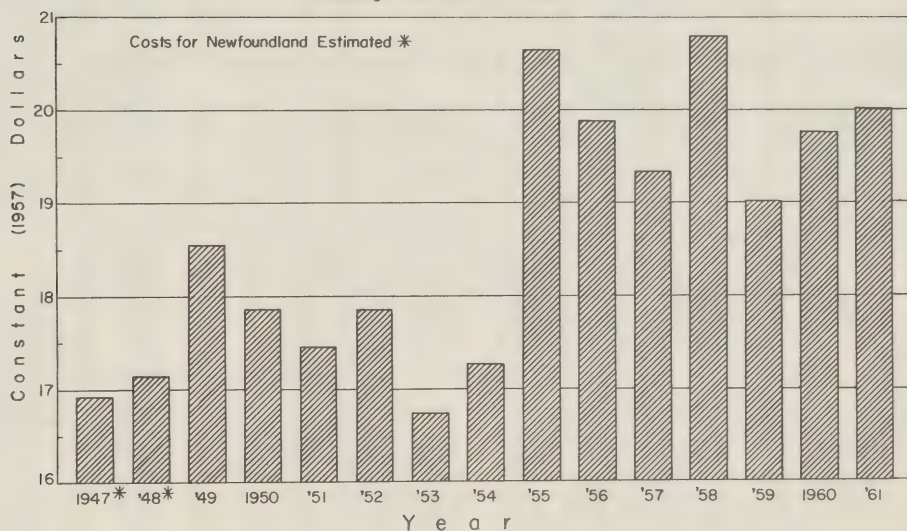


TABLE 1
SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Average for Previous Ten Years

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962
TOTAL NUMBER OF FIRES	5,764	6,157	59	46	73	82
AREA BURNED (in Acres)						
Merchantable timber	512,964	280,946	22,733	717	38,235	16,362
Young growth	472,101	154,301	50,462	42	46,439	455
Cut-over lands	338,289	138,420	441	-	100	370
Non-forested lands	696,819	243,738	125,323	19,096	423,947	8,338
TOTAL AREA BURNED	2,020,173	817,405	198,959	19,855	508,721	26,325
MERCHANTABLE TIMBER BURNED						
Saw timber (in M.ft. B.M.)	1,380,488	39,610	612	1,390	18,888	-
Small material (in cords)	2,740,282 ²	1,242,723	69,888	1,952	190,418	135,696
ESTIMATED VALUES DESTROYED ³	\$	\$	\$	\$	\$	\$
Merchantable timber	8,809,368	3,090,756	127,054	8,903	298,616	135,696
Young growth	2,479,501	1,416,623	97,593	86	82,006	909
Cut-over lands	377,159	704,510	441	-	100	370
Non-forested lands	113,634	380,942	810	4,774	34,697	2,134
Wood in process	161,106	718,303	-	-	-	-
Other property	773,342	511,474	16,700	355	545	1,913
TOTAL DAMAGE	12,714,110	6,822,608	242,598	14,118	415,964	141,022
FIRE CONTROL COSTS						
Actual fire-fighting	5,234,636	4,171,187	37,801	15,501	71,715	77,806
Capital, maintenance and overhead	21,363,511	25,687,128 ⁴	108,761	299,800	179,852	220,196
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	17,948,746	10,993,795	280,399	29,619	487,679	218,828
TOTAL DAMAGE AND FIRE CONTROL COSTS	39,312,257	36,500,000 ⁵	389,160	329,419	667,531	439,024

¹ Includes federal lands within provincial boundaries

² Weighted average. Province of Quebec figures not available for 3 years out of the 10-year period.

³ Wood values are based on prevailing stumpage rates

⁴ Capital, maintenance and overhead expenditures for year, 1961

⁵ Estimated.

only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

⁴ Capital, maintenance and overhead expenditures for year, 1961

⁵ Estimated.

SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Average for Previous Ten Years

TABLE 1 (Continued)

Item	Provinces ¹			Yukon		Northwest Territories	
	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962
NUMBER OF FOREST FIRES BY SIZE CLASS							
Under ¼ acre	2,380	2,837	25	29	15	-	-
¼ to 10 acres	2,273	2,535	14	7	20	42	42
11 to 100 acres	640	512	5	2	11	21	21
101 to 500 acres	242	173	3	3	6	7	7
Over 500 acres	229	100	12	5	21	12	12
TOTAL NUMBER OF FIRES	5,764	6,157	59	46	73	82	82
AREA BURNED BY SIZE CLASS							
Under ¼ acre	-	223	-	7	-	-	-
¼ to 10 acres	-	6,665	-	15	-	-	176
11 to 100 acres	-	17,284	-	194	-	-	725
101 to 500 acres	-	38,872	-	399	-	-	1,351
Over 500 acres	-	754,361	-	19,240	-	-	24,073
TOTAL AREA BURNED	2,020,173	817,405	198,959	19,855	508,721	26,325	26,325
AVERAGE FIRE SIZE	350	133	3,372	432	6,969	321	321
AREA UNDER PROTECTION (in sq. miles)	-	1,263,812	-	40,000	-	95,000	95,000

¹ Includes federal lands within provincial boundaries.

TABLE 2
FOREST FIRES BY CAUSES
With Comparative Figures for Year 1961

Causes	Provinces ¹			Yukon			Northwest Territories		
	Year 1961		Year 1962	Year 1961		Year 1962	Year 1961		Year 1962
	No.	%	No.	No.	%	No.	No.	%	%
Recreation	1,521	18	1,646	17	34	16	23	14	13
Settlement	1,036	12	594	5	10	6	6	4	4
Woods Operations	160	2	285	-	-	4	1	1	-
Other Industrial Operations ...	318	4	85	2	4	-	10	6	10
Railroads	318	4	216	-	-	1	-	-	-
Public Projects	121	1	88	3	6	-	5	3	-
Incendiary	352	4	231	2	4	-	-	-	-
Miscellaneous Known	1,302	16	1,176	10	20	3	9	5	6
Lightning	2,801	33	1,572	6	12	12	94	56	38
Unknown	509	6	264	5	10	4	19	11	11
TOTAL	8,438	100	6,157	50	100	46	167	100	82
									100

¹ Includes federal lands within provincial boundaries

TABLE 3

LEGAL ACTIONS AND FATALITIES
Comparative Statement by Regions

Province	Number of Prosecutions		Proceedings Under Fire Laws				Number of Fatalities	
			Number of Convictions		Ratio of Convictions to Prosecutions			
			Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962
British Columbia	59.4	18	53.7	18	90	90	1.7	2
Alberta	76.3	29	70.5	29	92	100	0.3	0
Saskatchewan	10.6	12	10.1	12	95	100	0.0	0
Manitoba	6.1	3	5.3	2	87	67	0.6	0
Ontario	57.0	48	49.6	43	87	90	0.4	0
Quebec	56.3	93	54.1	93	96	100	0.0	0
New Brunswick	22.8	15	22.2	15	97	100	0.1	0
Nova Scotia	6.9	21	6.9	20	100	95	0.0	0
Newfoundland	5.8	11	5.8	9	100	82	0.0	0
Yukon	1.5	2	1.2	2	80	100	0.1	0
Northwest Territories	1.9	0	1.6	0	84	-	0.0	0
Other Federal Lands	0.5	0	0.5	0	100	-	0.0	0
TOTAL	305.1	252	281.5	243	92	96	3.2	2

FOREST FIRES BY MONTHS
Compared with 10-Year Average

TABLE 4

Month	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1952-61		Year 1962		Annual Average 1952-61		Year 1962		Annual Average 1952-61		Year 1962	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
January	4	-	1	-	-	-	-	-	-	-	-	-
February	3	-	2	-	-	-	-	-	-	-	-	-
March	37	1	30	-	1	2	-	-	-	-	-	-
April	434	7	470	8	2	3	-	-	1	1	-	-
May	1,245	22	1,317	21	8	13	7	15	5	7	5	6
June	849	15	1,330	22	19	32	5	11	22	30	10	12
July	1,291	22	1,649	27	13	22	20	43	31	43	46	56
August	1,257	22	898	15	10	17	11	24	12	17	15	19
September	376	6	336	5	4	7	3	7	1	1	6	7
October	219	4	97	2	1	2	-	-	1	1	-	-
November	43	1	19	-	-	-	-	-	-	-	-	-
December	6	-	8	-	1	2	-	-	-	-	-	-
TOTAL	5,764	100	6,157	100	59	100	46	100	73	100	82	100

¹ Includes federal lands within provincial boundaries

TABLE 5

AREA BURNED BY MONTHS
Compared with Average for Previous Five Years

Month	Provinces ¹			Yukon			Northwest Territories		
	Annual Average 1957-61		Year 1962	Annual Average 1957-61		Year 1962	Annual Average 1957-61		Year 1962
	Acres	%	Acres	Acres	%	Acres	Acres	%	Acres
January ...	-	-	-	-	-	-	-	-	-
February ..	-	-	-	-	-	-	-	-	-
March	423	-	251	-	-	-	-	-	-
April	18,084	1	4,802	7	-	-	-	-	-
May	596,906	21	111,031	8,009	2	4	2,712	1	174
June	835,752	29	417,944	67,174	18	2,081	51,426	19	2,249
July	639,283	22	258,604	253,872	69	17,763	154,180	55	22,600
August	553,738	23	18,389	34,659	10	6	69,816	25	1,259
September .	51,200	2	2,646	2,030	1	1	8	-	43
October	46,676	2	3,711	-	-	-	-	-	-
November ..	417	-	19	-	-	-	-	-	-
December ..	6	-	8	63	-	-	-	-	-
TOTAL	2,942,485	100	817,405	365,844	100	19,855	278,142	100	26,325
									100

¹ Includes federal lands within provincial boundaries

TABLE 6
STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1952-61

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962
FIRES										
Total number	1,844	1,536	330	278	204	289	344	285	1,328	1,521
Caused by lightning	34.1	40.0	23.3	37.8	31.9	47.1	27.0	29.8	26.0	19.4
AREA BURNED (in acres)										
Merchantable timber	60,402	3,444	74,808	2,165	25,421	461	137,054	81,125	145,657	4,056
Young growth	58,926	2,151	80,656	343	110,021	1,173	122,169	33,337	43,578	2,455
Cut-over lands	219,934	19,318	8,768	612	12,482	4,886	7,066	1,144	7,018	1,865
Non-forested lands	124,384	20,704	74,870	1,386	139,413	9,109	248,331	60,378	9,073	5,428
TOTAL AREA BURNED	463,646	45,617	239,102	4,506	287,337	15,629	514,620	175,984	205,326	13,804
Average fire size	251	30	725	16	1,409	54	1,496	617	155	9
DAMAGE	\$ 3,071,865	\$ 592,145	\$ 2,081,232	\$ 83,263	\$ 451,068	\$ 12,810	\$ 967,509	\$ 516,736	\$ 4,036,676	\$ 249,003
ACTUAL FIRE-FIGHTING COST	\$ 1,697,130	\$ 430,000	\$ 763,031	\$ 769,085	\$ 275,205	\$ 281,820	\$ 191,976	\$ 167,818	\$ 1,231,591	\$ 529,785
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$ 4,768,995	\$ 1,022,145	\$ 2,844,263	\$ 852,348	\$ 726,273	\$ 294,630	\$ 1,159,485	\$ 684,554	\$ 5,268,267	\$ 778,788

TABLE 6 (Continued)

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1952-61

	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962
FIRES								
Total number	855	1,249	260	355	340	435	206	148
Caused by lightning	16.1	24.1	10.0	2.8	1.5	0.5	2.4	8.8
AREA BURNED (in acres)								
Merchantable timber	36,008	170,008	2,145	15,288	1,412	893	28,876	3,211
Young growth	37,928	89,006	1,188	23,062	1,621	660	13,879	1,382
Cut-over lands	66,182	102,101	1,906	7,896	551	555	13,235	43
Non-forested lands	22,937	131,918	3,428	836	3,778	2,904	66,614	10,951
TOTAL AREA BURNED	163,055	493,033	8,667	47,082	7,362	5,012	122,604	15,587
Average fire size	191	395	33	133	22	12	595	105
DAMAGE	1,113,796	4,577,550	85,340	660,959	77,087	16,242	816,281	111,943
ACTUAL FIRE-FIGHTING COST	829,645	1,471,336	58,188	129,724	30,758	360,732	126,912	17,128
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	1,943,441	6,048,886	143,528	790,683	107,845	376,974	943,193	129,071

TABLE 6 (Concluded)

STATISTICS OF FOREST FIRES BY REGIONS

Shown with Averages for the 10-year Period 1952-61

	Federal Lands							
	National Parks		Other Federal Lands		Yukon		Northwest Territories	
	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962	Annual Average 1952-61	Year 1962
FIRES								
Total number	35	48	18	13	59	46	73	82
Caused by lightning %	25.7	20.8	5.6	0.0	22.0	26.1	41.1	46.3
AREA BURNED (in acres)								
Merchantable timber	1,167	3	14	292	22,733	717	38,234	16,962
Young growth	2,124	729	11	3	50,462	42	46,439	455
Cut-over lands	1,122	-	25	-	441	-	100	370
Non-forested lands	3,467	115	524	9	125,323	19,096	423,948	8,538
TOTAL AREA BURNED acres	7,880	847	574	304	198,959	19,855	508,721	26,325
Average fire size acres	225	18	32	23	3,372	432	6,969	321
DAMAGE \$	12,607	1,891	649	66	242,598	14,118	415,964	141,022
ACTUAL FIRE-FIGHTING COST \$	28,357	12,865	1,844	894	37,801	15,501	71,715	77,806
TOTAL DAMAGE AND ACTUAL FIRE FIGHTING COST	40,964	14,756	2,493	960	280,399	29,619	487,679	218,828

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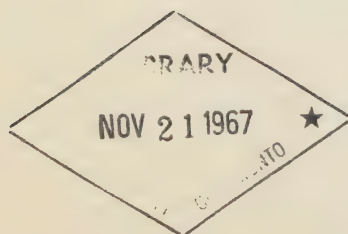


FOREST RESEARCH BRANCH

FOREST FIRE LOSSES IN CANADA 1963

by

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Ottawa
1964

Issued under the authority of
The Honourable Maurice Sauvé, P.C., M.P.,
Minister of Forestry
Ottawa, 1964

FOREST FIRE LOSSES IN CANADA 1963

INTRODUCTION

The forest fire season of 1963 was one of remarkable contrast. There were 7,670 fires reported in Canada, 7,557 in the provinces alone, totals exceeded only twice before, yet the average fire size in the provinces was a mere 58 acres, the lowest on record. At first glance these figures suggest a failure of fire prevention measures but a startling breakthrough in actual fire control. Of course, neither is correct. Improvement in fire control tends to be of a gradual nature while any sudden change usually can be traced to weather conditions.

Although it is difficult to generalize for the country as a whole, 1963 tended to be characterized by relatively short rain-free periods, except late in the fall in several areas of central Canada. Well-spaced showers undoubtedly helped hold the fire danger level down and assisted fire fighters in retaining fires to minimal sizes. Although the statistics available on a country-wide basis only permit formulation of generalizations, the evidence demonstrates a real improvement in forest fire control over the past thirty years, but the presence of stubborn problems remains.

INDICATIONS OF IMPROVEMENT

As noted previously (Mactavish and Lockman, 1963) the cost of forest fire prevention and suppression has increased over recent years. The total increase in constant dollar terms amounted to about 80 per cent between 1947 and 1961, but since the forest areas receiving protection in most provinces also increased during this period, the net real increase in costs per unit area has been less dramatic, amounting to about 17 per cent.

Unfortunately, expenditures for fire prevention cannot be extracted from available data, nor has a method been developed to estimate the effects of prevention programs. The fact remains, however, that since 1931 the number of fires reported in the provinces has fluctuated widely, ranging from a low of 2,952 in 1954 to a high of 8,438 in 1961. As shown in Figure 1, no real trend in fire occurrence can be discerned for the period as a whole, but there has been a disquieting upward movement since the mid '50's, a trend reinforced in 1963. Only in the infamous 1961 was a greater number of fires reported during this period.

The number of lightning-caused fires continued to be above average in 1963, accounting for 2,306 fires, or 31 per cent of the provincial totals. This percentage would be much higher were fire prevention programs more effective, but careless people continued to take their toll. Recreationists were the most inimical group, causing more than 2,000 fires, 27 per cent of the total number and 39 per cent of all man-caused fires. Certainly, the situation could have been worse were no effort expended on fire prevention, but there is considerable room for improvement.

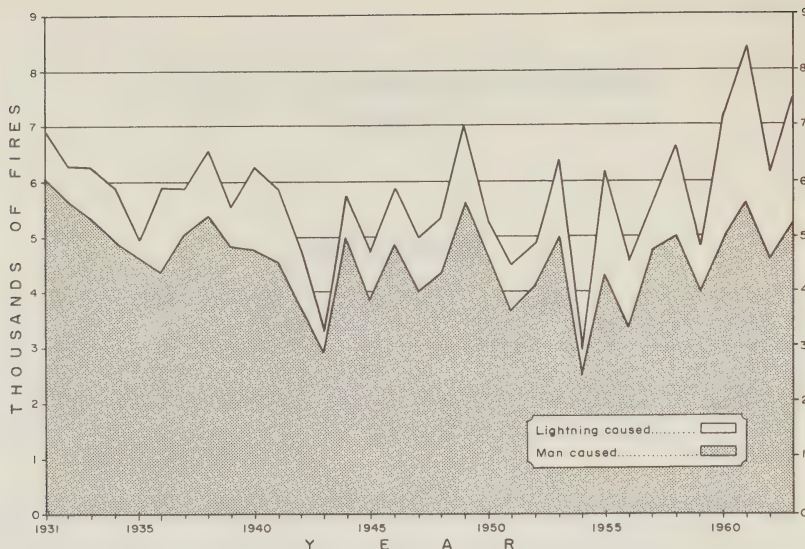


Figure 1. Forest fire occurrence (excluding Yukon and N.W.T.)

Excluding consideration of fire prevention there has been a marked advance in presuppression and fire suppression measures. As shown in Figure 2, the number of fires held to a minimal size of less than one-quarter acre has increased from an average of 1560 from 1934 to 1938 to an average of 3107 during the last five years. In addition, the percentages of all fires held to less than one-quarter acre has also increased, from 26.7 per cent to 45.6 per cent between the two periods (Figure 3). Little trend is evident for numbers of fires reaching final sizes between one-quarter and ten acres, but the annual number of fires between 11 and 500 acres has dropped from an average of 1513 from 1934 to 1938 to an average of 902 between 1959 and 1963. The proportion of all fires reaching this size class has been cut almost in half over the 30-year period, from 25.9 per cent during the first fire years to 13.2 per cent. Thus the evidence points to a definite improvement in initial attack effectiveness.

The most important fire-size category is for fires of more than 500 acres. Over the post-war years, 1946-1963, but excluding 1961, nearly two-thirds of the variation in annual total area burned in the provinces apparently resulted from variations in the occurrence of these large fires (coefficient of determination .63). Figures for 1961 were omitted from the analyses since they differed so greatly from those of other years; however, had they been included the relationship between area burned and numbers of large fires would have been stronger. Unfortunately, country-wide statistics for a total area burned by fires in the different size classes are only available for 1962 and 1963, but these figures serve to indicate the overwhelming importance of a very small proportion of all fires. In each of these years only 1.6 per cent of all fires in the provinces exceeded 500 acres each, yet in 1962 these fires accounted for 92.3 per cent of the total area burned, while in 1963 they accounted for 78.7 per cent. The annual number of fires exceeding 500 acres has diminished from an average of 416 in the 1934-1938 period to 230 from 1959 to 1963 (Figure 2), and as shown in Figure 3 the proportion of fires reaching this size has been gradually diminishing, amounting to but 3.4 per cent of all fires during the last five years, in spite of the severe losses of 1961.

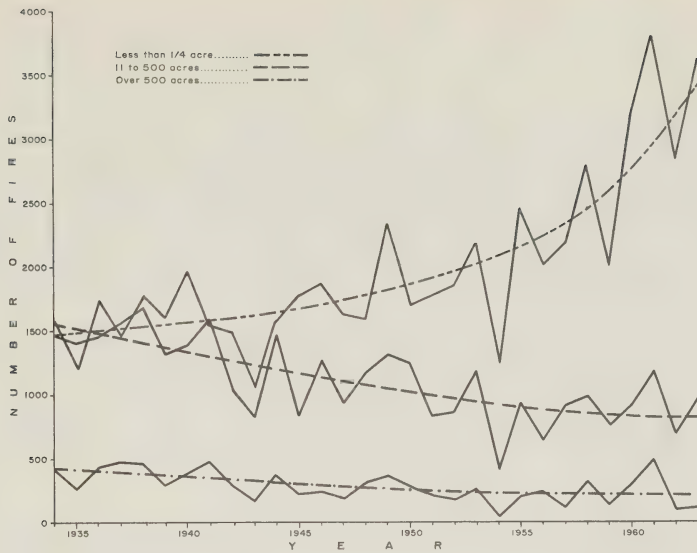


Figure 2. Annual number of fires by size.

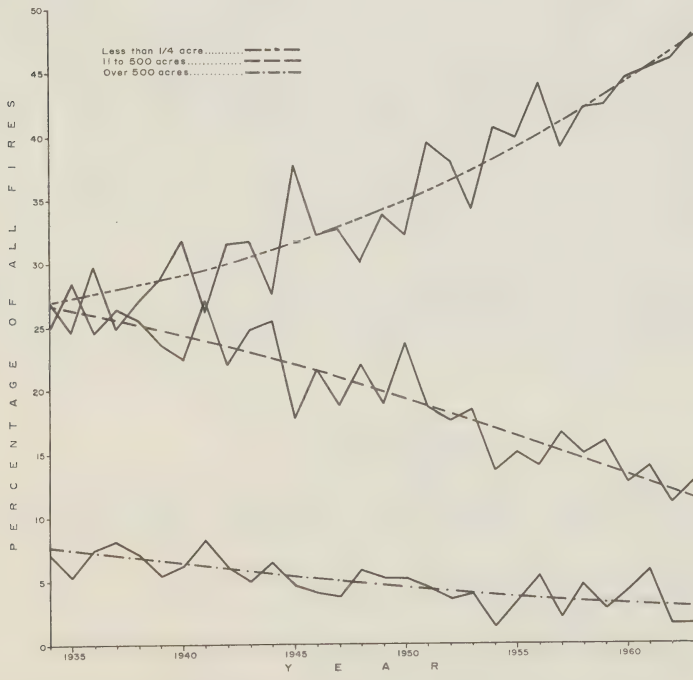


Figure 3. Percentage of fires by size.

It should be noted that the decrease in numbers of large fires is the more remarkable since it has been accompanied by increases in forest area receiving protection. Complete figures are available only from 1949, but since that time the area receiving fire control has increased 27 per cent. Since much of the newly protected land is in the relatively inaccessible regions where a higher proportion of fires could be expected to become large, it seems logical to speculate that the number of large fires in the more accessible and valuable forest regions has decreased even faster than indicated in Figure 3.

It has been recognized for some time that a very few large fires per year can spell failure to the best of current fire control plans, and that a single conflagration can nullify years of waiting and careful tending of developing crops. Recently there has been increased attention directed to study of large fires in attempts to learn how these fires escape initial control action and what kinds of suppression techniques are required to subdue large fires. There remains a basic lack of knowledge of the fundamental variables of fire behaviour, fire control and the economics of fire control.

Time has long been recognized as critically important in fire control, yet the effects of time on the rates of spread and fire intensities of incipient fires in different fuel types, topographic conditions, seasons, and fire danger levels are poorly understood. The types, strengths and costs of initial suppression action required to effect control of fires allowed to spread for different periods of time under ranges of fire intensity, rate of spread, and other variables remain largely in the realms of speculation. The costs and losses associated with various total elapsed times between incidence and control of fires can be reduced through improved detection, communication and transportation systems, and/or by employing stronger suppression forces; but the time or cost-reducing effectiveness of many fire control innovations have not been determined. Estimation of some aspects of fire control costs requires considerable refinement and damage estimation techniques are often crude. Thus, although the importance of the time in fire control has been recognized, and models have been developed for determining economic standards for fire control (Arnold 1950), Mactavish 1964) using time as an independent variable, the development of practical guides for fire control remains frustrated by a lack of fundamental knowledge of individual variables and their interrelationships.

As the uses of the forests have become more numerous and complex, forest fire control has become more essential and more expensive. Problems relating to the economic level of total expenditures and apportionment of funds among fire control endeavours must soon be faced if adequate forest protection is to be assured.

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SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

TABLE 1

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963
TOTAL NUMBER OF FIRES	5,891	7,557	62	44	78	60
AREA BURNED (in Acres)						
Merchantable timber	522,769	92,297	22,341	1,145	39,864	4,341
Young growth	462,931	112,068	50,366	747	46,419	1,521
Cut-over lands	338,194	63,465	440	-	131	-
Non-forested lands	680,494	170,595	124,634	9,787	411,227	14,035
TOTAL AREA BURNED	2,004,388	438,425	197,781	11,679	497,641	19,897
MERCHANTABLE TIMBER BURNED						
Saw timber (in M.ft.B.M.)	1,354,132	119,663	751	4,396	18,887	-
Small material (in cords)	2,757,610 ²	722,329	67,088	2,689	205,339	18,132
ESTIMATED VALUES DESTROYED ³						
Merchantable timber	\$ 9,008,083	\$ 2,625,752	\$ 126,460	\$ 5,465	\$ 312,034	\$ 9,066
Young growth	2,523,759	781,118	97,452	1,494	82,030	3,039
Cut-over lands	437,062	221,464	440	-	131	-
Non-forested lands	150,356	48,709	1,287	2,446	8,223	3,507
Wood in process	212,001	93,212	-	-	-	-
Other property	731,806	469,342	15,936	789	27,404	523
TOTAL DAMAGE	13,063,067	4,239,597	241,575	10,194	429,822	16,135
FIRE CONTROL COSTS						
Actual fire-fighting	5,481,829	4,654,234	38,966	45,421	75,322	73,059
Capital, maintenance and overhead	22,643,118	28,236,981 ⁴	135,423	324,500	187,855	203,335
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	18,544,896	8,893,831	280,541	55,615	505,144	89,194
TOTAL DAMAGE AND FIRE CONTROL COSTS	41,188,014	36,500,000 ⁵	415,964	380,115	692,999	292,529

TABLE 1 (Continued)

SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

Item	Provinces		Yukon		Northwest Territories	
	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963
NUMBER OF FOREST FIRES BY SIZE CLASS						
Under 1/4 acre	2,478	3,633	28	22	15	7
1/4 to 10 acres	2,328	2,838	14	8	23	37
11 to 100 acres	629	735	5	7	12	11
101 to 500 acres	235	232	3	3	6	7
Over 500 acres	221	119	12	4	22	7
TOTAL NUMBER OF FIRES	5,891	7,557	62	44	78	69
AREA BURNED BY SIZE CLASS						
Under 1/4 acre	-	339	-	3	-	-
1/4 to 10 acres	-	6,307	-	14	-	105
11 to 100 acres	-	28,591	-	302	-	436
101 to 500 acres	-	58,058	-	560	-	2,142
Over 500 acres	-	345,130	-	10,800	-	17,214
TOTAL AREA BURNED	2,004,388	438,425	197,781	11,679	497,641	19,897
AVERAGE FIRE SIZE	340	58	3,190	265	6,380	288
AREA UNDER PROTECTION (in sq. miles)		1,267,185		40,000		95,000

¹ Includes federal lands within provincial boundaries.

² Weighted average. Province of Quebec figures not available for 2 years out of the 10 year period.

³ Wood values are based on prevailing stumpage

rates only; damages to soil, site quality stream flow regulation, wildlife, recreational and similar values are not included.

⁴ Capital, maintenance and overhead expenditures for year 1962.

⁵ Estimated.

TABLE 2
FOREST FIRES BY CAUSES
Compared with Averages for Previous Two Years

Causes	Provinces¹				Yukon				Northwest Territories			
	Annual Average 1961-62		Year 1963		Annual Average 1961-62		Year 1963		Annual Average 1961-62		Year 1963	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Recreation	1,584	22	2,055	27	17	36	13	30	18	14	12	18
Settlement	815	11	851	11	5	10	9	20	5	4	4	6
Woods Operations	222	3	123	2	2	4	-	-	1	1	1	1
Other Industrial Operations.	201	3	263	3	1	2	6	14	10	8	10	15
Railroads	267	4	231	3	1	2	-	-	-	-	-	-
Public Projects	104	1	137	2	1	2	-	-	2	2	1	1
Incendiary	291	4	323	4	1	2	-	-	-	-	-	-
Miscellaneous Known	1,239	17	1,036	14	7	15	-	-	8	6	4	6
Lightning	2,187	30	2,306	31	9	19	11	25	66	53	34	49
Unknown	387	5	232	3	4	8	5	11	15	12	3	4
TOTAL	7,297	100	7,557	100	48	100	44	100	125	100	69	100

¹ Includes federal lands within provincial boundaries

TABLE 3
AREA BURNED BY CAUSES
Compared with Average for Previous Two Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-62		Year 1963		Annual Average 1961-62		Year 1963		Annual Average 1961-62		Year 1963	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Recreation	562,104	12	79,072	18	14	-	64	1	6,266	2	16	-
Settlement	1,047,738	23	83,926	19	50	-	1	-	6	-	1	-
Woods Operations	352,569	8	16,208	4	1	-	-	-	-	-	4	-
Other Industrial Operations ..	59,174	1	11,451	3	-	-	805	7	1,104	-	280	1
Railroads.....	12,875	-	2,749	1	-	-	-	-	-	-	-	-
Public Projects	10,571	-	3,322	1	2	-	-	-	1	-	16	-
Incendiary	67,468	1	10,782	2	-	-	-	-	-	-	-	-
Miscellaneous Known	76,139	2	5,945	1	-	-	-	-	135	-	7	-
Lightning	2,375,279	51	221,254	50	52,589	91	969	8	371,788	95	18,695	94
Unknown	74,772	2	3,716	1	4,909	9	9,840	84	12,977	3	878	5
TOTAL	4,638,689	100	438,425	100	57,565	100	11,679	100	392,277	100	19,897	100

¹Includes federal lands within provincial boundaries

TABLE 4

FOREST FIRES BY MONTHS
Compared with 10-year Average

Month	Provinces ¹			Yukon			Northwest Territories		
	Annual Average 1953-62		Year 1963	Annual Average 1953-62		Year 1963	Annual Average 1953-62		Year 1963
	No.	%	No.	No.	%	No.	No.	%	No.
January	4	-	2	-	-	-	-	-	-
February	3	-	5	-	-	-	-	-	-
March	38	1	45	1	2	-	-	-	-
April	416	7	536	2	3	-	1	1	-
May	1,289	22	1,506	8	13	8	5	6	13
June	935	16	1,323	19	30	5	22	28	16
July	1,355	23	1,690	15	24	17	34	44	31
August	1,250	21	1,249	11	18	9	13	17	8
September	365	6	423	4	6	4	2	3	1
October	191	3	691	1	2	1	1	1	-
November	39	1	78	-	-	-	-	-	-
December	6	-	9	1	2	-	-	-	-
TOTAL	5,891	100	7,557	62	100	44	78	100	69
									100

¹ Includes federal lands within provincial boundaries

TABLE 5
AREA BURNED BY MONTHS
Compared with Averages for Previous Six Years

Month	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1957-62		Year 1963		Annual Average 1957-62		Year 1963		Annual Average 1957-62		Year 1963	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
January ...	-	-	-	-	-	-	-	-	-	-	-	-
February ..	-	-	1	-	-	-	-	-	-	-	-	-
March	394	-	117	-	-	-	-	-	-	-	-	-
April	15,871	1	9,127	2	6	-	-	-	-	-	-	-
May	515,927	20	89,759	21	6,675	2	2	-	2,289	1	59	-
June	766,117	31	162,374	37	56,325	18	3	-	43,229	18	12,005	61
July	575,836	23	78,819	18	214,520	70	9,272	80	132,250	56	6,951	35
August	547,847	22	44,399	10	28,909	9	1,562	13	58,390	25	879	4
September .	43,108	2	4,476	1	1,692	1	840	7	14	-	3	-
October ...	39,515	1	41,258	9	-	-	-	-	-	-	-	-
November ..	351	-	8,093	2	-	-	-	-	-	-	-	-
December ..	6	-	2	-	53	-	-	-	-	-	-	-
TOTAL	2,504,972	100	438,425	100	308,180	100	11,679	100	236,172	100	19,897	100

¹ Includes federal lands within provincial boundaries

TABLE 6
LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

Provinces	Proceedings Under Fire Laws						Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions			
	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963
British Columbia	56.9	19	51.5	11	91	58	1.7	0
Alberta	71.7	37	66.6	36	93	97	0.3	0
Saskatchewan	10.8	10	10.3	6	95	60	0.0	0
Manitoba	6.1	7	5.3	5	87	71	0.6	0
Ontario	55.4	71	48.4	65	87	92	0.4	0
Quebec	64.5	105	62.3	93	97	89	0.0	0
New Brunswick	19.6	13	19.4	13	99	100	0.1	0
Nova Scotia	8.7	5	8.6	5	99	100	0.0	0
Newfoundland	6.9	17	6.7	17	97	100	0.0	0
Yukon	1.6	1	1.3	1	81	100	0.1	0
Northwest Territories ...	1.1	0	0.8	0	73	-	0.0	0
Other Federal Lands	0.4	2	0.4	2	100	100	0.0	0
TOTAL	303.7	287	281.6	254	93	89	3.2	0

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1953-62

TABLE 7	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963
FIRES										
Total Number	1,822	2,345	339	554	219	255	334	443	1,371	1,885
Caused by lightning	35.5	48.8	25.5	47.5	35.6	41.6	28.6	28.2	26.4	16.9
AREA BURNED (in acres)										
Merchantable timber	58,968	3,121	63,234	7,803	24,922	2,847	143,487	17,963	145,840	29,846
Young growth	57,326	5,965	62,764	4,925	109,503	71,718	122,559	4,009	43,445	296
Cut-over lands	216,448	2,665	8,603	1,826	12,486	18,228	4,857	592	6,929	4,250
Non-forested lands	120,225	34,595	56,519	3,055	138,182	48,714	243,938	47,913	9,250	21,746
TOTAL AREA BURNED	452,967	46,346	191,120	17,609	285,093	141,507	514,841	70,477	205,464	56,138
Average fire size	249	20	564	32	1,302	555	1,541	159	150	30
DAMAGE	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
ACTUAL FIRE-FIGHTING COST	3,031,968	534,272	1,960,905	273,458	448,038	481,327	997,155	73,236	4,056,464	747,269
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	1,660,435	440,884	833,761	1,192,876	299,787	291,419	201,658	115,676	1,256,465	1,084,161
	4,692,403	975,156	2,794,666	1,466,334	747,825	772,746	1,198,813	188,912	5,312,929	1,831,430

TABLE 7 (Continued)

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1953-62

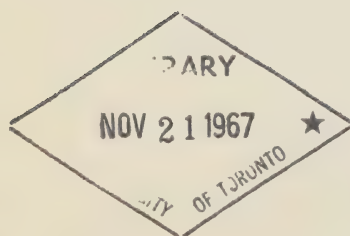
	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963
FIRES								
Total number	919	1,172	271	376	360	376	201	109
Caused by lightning	17.6	24.6	8.7	11.4	1.2	0.0	3.0	5.5
AREA BURNED (in acres)								
Merchantable timber	51,640	30,118	3,640	121	1,484	458	28,583	19
Young growth	46,244	23,286	3,441	1,110	1,594	527	13,891	100
Cut-over lands	72,962	34,104	2,529	293	593	174	12,395	1,332
Non-forested lands	35,927	8,712	3,339	864	3,831	1,140	66,220	3,745
TOTAL AREA BURNED	206,773	96,220	12,949	2,388	7,502	2,299	121,089	5,196
Average fire size acres	225	82	48	6	21	6	602	48
DAMAGE								
\$	1,514,312	2,095,859	148,711	18,594	76,505	8,703	816,033	6,111
ACTUAL FIRE-FIGHTING COST \$	949,933	1,470,383	63,572	20,291	64,174	13,849	121,676	20,811
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST \$	2,464,245	3,566,242	212,283	38,885	140,679	22,552	937,709	26,922

TABLE 7 (Concluded)
STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1953-62

	Federal Lands							
	National Parks		Other Federal Lands		Yukon		Northwest Territories	
	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963	Annual Average 1953-62	Year 1963
FIRES								
Total number	36	29	19	13	62	44	78	69
Caused by lightning %	26.8	41.4	3.2	0.0	22.6	25.0	43.1	49.3
AREA BURNED (in acres)								
Merchantable timber	928	1	43	-	22,341	1,145	39,864	4,341
Young growth	2,153	88	11	44	50,366	747	46,419	1,521
Cut-over lands	367	1	25	-	440	-	131	-
Non-forested lands	2,538	96	525	15	124,634	9,787	411,227	14,035
TOTAL AREA BURNED	5,986	186	604	59	197,781	11,679	497,641	19,897
Average fire size acres	166	6	32	5	3,190	265	6,380	288
DAMAGE \$	12,320	672	656	96	241,575	10,194	429,322	16,135
ACTUAL FIRE-LIGHTNING COST \$	28,435	3,182	1,933	702	38,966	45,421	75,322	73,059
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	40,755	3,854	2,589	798	280,541	55,615	505,144	89,194

● FOREST FIRE LOSSES IN CANADA 1964

by M. R. Lockman



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FOREST FIRE LOSSES IN CANADA

1964

INTRODUCTION

The report on forest fire losses in Canada for 1963 referred to the gratifyingly low loss figures reported that year as further evidence of a real improvement in forest fire control. At first glance, figures for 1964 might indicate that jubilation over such good news may have led to a feeling of complacency on the part of some fire control organizations. However, such is not the case. Closer examination of the facts reveals that most of the increase in area burned is accounted for by unusually high acreage losses in Manitoba and Saskatchewan. These two provinces reported a combined total of 2,010,452 acres of forest damaged or destroyed in 1964, compared with an average of 786,787 for the previous ten years and about 212,000 in 1963. It should, also, be pointed out that a large proportion of the 1964 losses occurred in the northern part of the Prairie Provinces, an area usually afforded only little protection against fire.

LOSSES IN 1964

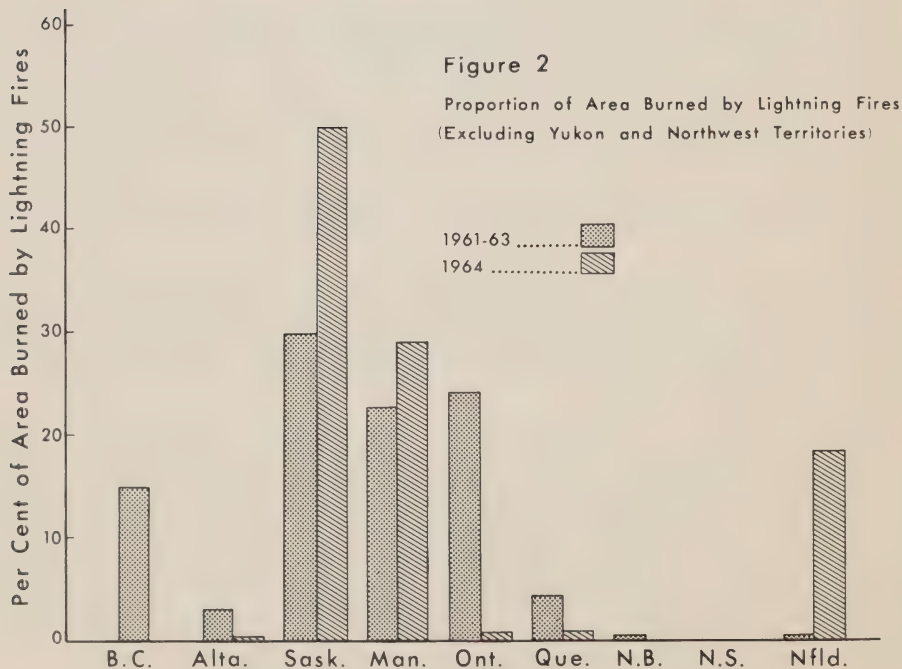
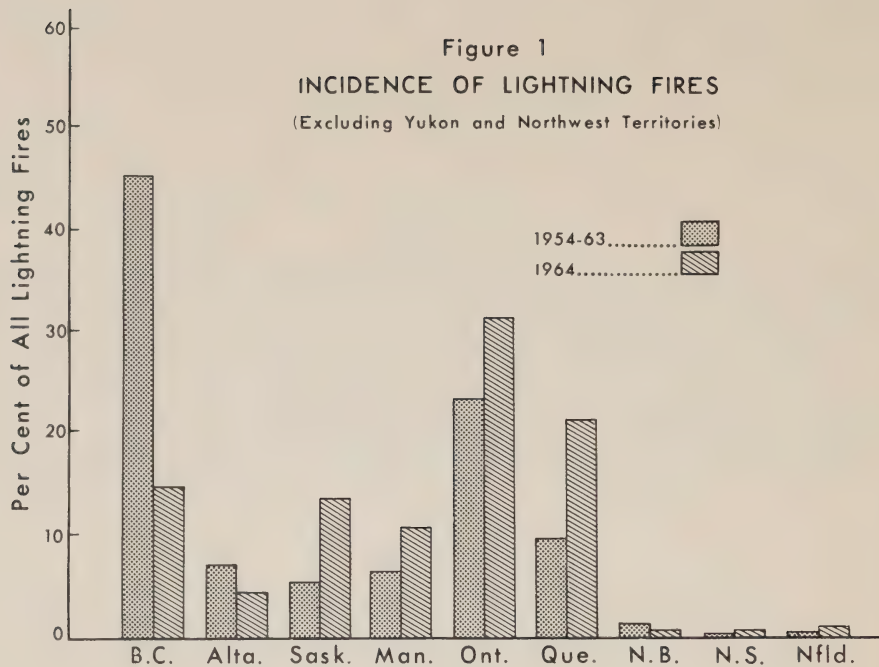
The total number of fires in Canada, exclusive of the Yukon and Northwest Territories, was 6,757 during 1964 – a figure slightly above the average for the previous ten years. Although the total number of fires was some 10 per cent less than that for 1963, there was not a corresponding decrease in the burned area. The area burned in 1964 was 2,522,326 acres, almost six times as much as the figure reported the previous year, and about 32 per cent higher than the ten-year average.

It is becoming increasingly well known that a very small percentage of the total number of forest fires occurring each year accounts for a large percentage of the total area burned. Seldom, however, has this relationship been more clearly demonstrated than in 1964. The three hardest hit provinces reported a combined total of 1,172 fires that burned some 2,368,000 acres, but 12.9 per cent of these fires accounted for 99 per cent of the area burned. Furthermore, country-wide statistics for fires exceeding 500 acres in size show that a mere 3 per cent of the total number of fires in all provinces accounted for 97 per cent of the area burned.

The estimated values destroyed by forest fires in 1964 totalled some \$5,640,000 which was about one million dollars more than the losses for 1963, but considerably less than the average for the previous ten years.

A remarkable fact about fire occurrence by causes (Table 2) is the close agreement between the numbers and percentages by causes of the 1964 fires and the annual average numbers and percentages of those that occurred during the previous three years. Lightning continued to be the greatest bugbear for fire control personnel in 1964, 28 per cent of the provincial total being ascribed to this cause, followed by recreation with 23 per cent.

Equally noteworthy is the marked increase in percent of areas burned attributed to lightning (Table 3). Although country-wide figures are available only since 1961, the annual average for the three-year period ending in 1963 shows 51 per cent of the total area burned attributed to lightning fires as compared to 77 per cent in 1964. Figures 1 and 2 point out the striking contrast between the percentage of all lightning fires by provinces and corresponding figures for areas burned attributed to this cause. In 1964 about 32 per cent of the total number of lightning fires occurred in the Province of Ontario, but these fires accounted for less than one per cent of the total area burned ascribed to this cause. Saskatchewan, on the other hand, reported only 14 per cent of the number, but half the total area burned. As suggested earlier, the inaccessibility of a large proportion of these lightning fires in the latter case, undoubtedly contributed to the unusually severe losses attributed to this cause.



The four worst months for forest fires in Canada are usually May, June, July and August. The same holds true for the average monthly areas burned during that period (Table 5) though country-wide figures for this category of statistics date back only to 1957. It may be seen from Table 5, however, that in 1964 the months of June and July alone accounted for 94 per cent of the total area burned in the provinces.

Undoubtedly the most outstanding feature of the 1964 fire season was the record low acreage burned in British Columbia — only 7,746 acres, the lowest since national forest fire loss statistics were first collected in 1919. The low acreage burned in 1964 was directly reflected in the average fire size, a mere 7 acres compared with the 10-year average of 236 acres. By contrast Newfoundland suffered one of its worst fire years since records were begun in 1949, second only to the disastrous 1961 season. Although only 131 forest fires were reported there in 1964, 33 per cent less than the ten-year average, the total area burned, which amounted to 358,215 acres, represents a three-fold increase over the annual average.

There were substantially fewer prosecutions for infractions of the fire laws during the year than there were on the average during the previous decade — 208 compared to 311 — however, the ratio of convictions to prosecutions in 1964 remained high as 97 per cent of those persons brought to court were found guilty. For the second consecutive year, no deaths were attributed to forest fires in 1964.

SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

TABLE 1

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964
TOTAL NUMBER OF FIRES	6,002	6,757	62	25	78	162
AREA BURNED (in acres)						
Merchantable timber	511,687	486,295	22,191	177	32,946	197,354
Young growth	426,936	587,633	46,781	6	35,840	46,540
Cut-over lands	316,665	32,078	420	—	131	4
Non-forested lands	657,130	1,416,320	121,802	297	215,496	226,586
TOTAL AREA BURNED	1,912,418	2,522,326	191,194	480	284,413	470,484
MERCHANTABLE TIMBER BURNED						
Saw timber (in M. ft. B.M.)	1,347,658	78,139	1,189	—	9,454	152
Small material (in cords)	2,682,987 ²	2,355,073	66,140	543	172,420	853,883
ESTIMATED VALUES DESTROYED ³						
Merchantable timber	\$ 9,046,567	\$ 3,949,178	\$126,394	\$ 272	\$228,394	\$ 765,552
Young growth	2,494,000	1,145,970	90,281	10	71,679	76,695
Cut-over lands	428,532	96,762	420	—	131	4
Non-forested lands	154,376	38,073	1,532	74	8,573	35,319
Wood in process	201,257	95,605	—	—	—	—
Other property	710,529	318,890	15,879	543	26,931	—
TOTAL DAMAGE	\$ 13,035,261	\$ 5,644,478	\$234,506	\$ 899	\$335,708	\$ 877,570
FIRE CONTROL COSTS						
Actual fire-fighting	\$ 5,545,382	\$ 4,111,754	\$ 41,886	\$ 3,120	\$ 74,342	\$ 315,167
Capital, maintenance and overhead	23,944,641	26,000,000 ⁴	163,243	327,000	196,461	272,142
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$18,580,643	\$ 9,756,232	\$276,392	\$ 4,019	\$410,050	\$1,192,737
TOTAL DAMAGE AND FIRE CONTROL COSTS	\$42,525,284	\$36,000,000 ⁵	\$439,635	\$331,019	\$606,511	\$1,464,879

(Continued)

SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

TABLE 1 (Cont.)

Item	Provinces		Yukon		Northwest Territories	
	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964
NUMBER OF FOREST FIRES						
BY SIZE CLASS						
Under ¼ acre	2,621	2,847	28	16	14	21
¼ to 10 acres	2,333	2,825	14	6	26	69
11 to 100 acres	618	682	6	2	12	27
101 to 500 acres	223	201	3	1	6	14
Over 500 acres	207	202	11	—	20	31
TOTAL NUMBER OF FIRES	6,002	6,757	62	25	78	162
AREA BURNED BY SIZE CLASS						
Under ¼ acre	—	264	—	2	—	—
¼ to 10 acres	—	7,038	—	8	—	260
11 to 100 acres	—	23,441	—	70	—	909
101 to 500 acres	—	41,893	—	400	—	3,447
Over 500 acres	—	2,449,690	—	—	—	465,868
TOTAL AREA BURNED	1,912,418	2,522,326	191,194	480	284,413	470,484
AVERAGE FIRE SIZE	319	373	3,084	19	3,646	2,904
AREA UNDER PROTECTION (in sq. miles)	—	1,379,924	—	40,000	—	95,000

¹ Includes federal lands within provincial boundaries.

² Weighted average. Province of Quebec figures not available for 2 years out of the 10-year period.

³ Wood values are based on prevailing stumpage rates only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

⁴ Estimated. (Actual expenditures for year 1963; \$28,902,913)

⁵ Estimated.

TABLE 2
FOREST FIRES BY CAUSES
Compared with Averages for Previous Three Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-63		Year 1964		Annual Average 1961-63		Year 1964		Annual Average 1961-63		Year 1964	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreation	1,741	24	1,588	23	15	32	3	12	16	15	26	16
Settlement	827	11	953	14	7	15	6	24	5	5	—	—
Woods Operations	189	2	217	3	1	2	—	—	1	1	—	—
Railroads	255	3	220	3	—	—	—	—	—	—	—	—
Other Industries	337	5	220	3	4	9	3	12	12	11	15	9
Incendiary	302	4	381	6	1	2	—	—	—	—	—	—
Misc. Known	1,172	16	923	14	4	9	6	24	6	6	3	2
Unknown	335	5	376	6	5	10	4	16	11	10	11	7
TOTAL MAN CAUSED	5,158	70	4,878	72	37	79	22	88	51	48	55	34
LIGHTNING	2,226	30	1,879	28	10	21	3	12	55	52	107	66
TOTAL	7,384	100	6,757	100	47	100	25	100	106	100	162	100

¹ Includes federal lands within provincial boundaries.

TABLE 3

AREA BURNED BY CAUSES Compared with Average for Previous Three Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-63		Year 1964		Annual Average 1961-63		Year 1964		Annual Average 1961-63		Year 1964	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Recreation	401,093	12	194,020	8	31	-	1	-	4,183	2	153	-
Settlement	726,467	22	111,067	4	33	-	1	-	4	-	-	-
Woods Operations	240,448	7	24,611	1	1	-	-	-	1	-	-	-
Railroads	9,500	-	1,667	-	-	-	-	-	-	-	-	-
Other Industries	51,421	2	194,563	8	270	1	1	-	836	-	11,761	2
Incendiary	48,573	2	26,488	1	-	-	-	-	-	-	-	-
Misc. Known	52,619	2	25,191	1	-	-	2	1	93	-	1	-
Unknown	51,209	2	4,970	-	6,553	15	5	1	8,944	3	12,579	3
TOTAL MAN CAUSED	1,581,330	49	582,577	23	6,888	16	10	2	14,061	5	24,494	5
LIGHTNING	1,657,271	51	1,939,749	77	35,382	84	470	98	254,090	95	445,990	95
TOTAL	3,238,601	100	2,522,326	100	42,270	100	480	100	268,151	100	470,484	100

¹ Includes federal lands within provincial boundaries.

FOREST FIRES BY MONTHS
Compared with 10-Year Average

TABLE 4

Month	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1954-63		Year 1964		Annual Average 1954-63		Year 1964		Annual Average 1954-63		Year 1964	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
January	4	-	5	-	-	-	-	-	-	-	-	-
February	3	-	6	-	-	-	-	-	-	-	-	-
March	38	1	34	1	1	2	-	-	-	-	-	-
April	443	7	634	9	2	3	2	8	1	1	-	-
May	1,298	22	1,845	27	8	13	7	28	5	6	7	4
June	976	16	1,391	21	17	27	7	28	22	28	39	24
July	1,436	24	1,753	26	16	26	4	16	35	45	85	53
August	1,167	19	544	8	11	17	4	16	12	16	30	18
September	368	6	240	3	4	6	1	4	2	3	1	1
October	226	4	198	3	1	2	-	-	1	1	-	-
November	36	1	103	2	1	2	-	-	-	-	-	-
December	7	-	4	-	1	2	-	-	-	-	-	-
TOTAL	6,002	100	6,757	100	62	100	25	100	78	100	162	100

¹ Includes federal lands within provincial boundaries.

TABLE 5

AREA BURNED BY MONTHS
Compared with Averages for Previous Seven Years

Month	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1957-63		Year 1964		Annual Average 1957-63		Year 1964		Annual Average 1957-63		Year 1964	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
January	—	—	1	—	—	—	—	—	—	—	—	—
February	—	—	252	—	—	—	—	—	—	—	—	—
March	355	—	10	—	—	—	—	—	—	—	—	—
April	14,907	1	53,962	2	5	—	—	—	—	—	—	—
May	455,046	20	104,020	4	5,722	2	3	1	1,970	1	18	—
June	679,868	31	1,332,602	53	48,279	18	425	89	38,769	19	85,985	18
July	504,834	23	1,019,290	41	185,199	70	51	10	114,350	56	314,354	67
August	475,925	21	1,105	—	25,002	9	1	—	50,174	24	70,126	15
September	37,589	2	1,445	—	1,570	1	—	—	13	—	1	—
October	39,764	2	7,468	—	—	—	—	—	—	—	—	—
November	1,457	—	2,171	—	—	—	—	—	—	—	—	—
December	6	—	—	—	45	—	—	—	—	—	—	—
TOTAL	2,209,751	100	2,522,326	100	265,822	100	480	100	205,276	100	470,484	100

¹ Includes federal lands within provincial boundaries.

TABLE 6
LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

Provinces	Proceedings Under Fire Laws							Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions				
	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	
British Columbia	56.1	10	50.2	10	.89	1.00	1.7	0	
Alberta	69.6	17	64.9	17	.93	1.00	0.3	0	
Saskatchewan	11.4	4	10.6	4	.93	1.00	.0	0	
Manitoba	6.4	18	5.4	16	.84	.89	0.5	0	
Ontario	57.7	22	50.8	22	.88	1.00	0.4	0	
Quebec	73.3	72	69.9	70	.95	.97	.0	0	
New Brunswick	17.2	36	17.1	35	.99	.97	0.1	0	
Nova Scotia	8.3	9	8.2	9	.99	1.00	0.0	0	
Newfoundland	7.9	20	7.7	19	.97	.95	0.0	0	
Yukon	1.4	0	1.2	0	.86	-	0.0	0	
Northwest Territories	0.9	0	0.6	0	.67	-	0.0	0	
Other Federal lands	0.6	0	0.6	0	1.00	-	0.0	0	
TOTAL	310.8	208	287.2	202	.92	.97	3.0	0	

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1954-63

TABLE 7

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964
FIRES										
Total number	1,922	1,120	380	361	228	460	356	581	1,408	1,829
Caused by lightning (per cent)	36.5	24.7	29.4	23.8	37.7	56.1	29.1	34.8	25.5	32.3
AREA BURNED (in acres)										
Merchantable timber	59,022	293	55,881	4,016	23,978	69,468	142,879	302,125	147,581	18,951
Young growth	57,522	861	51,875	3,266	107,813	468,310	116,661	79,141	40,499	-
Cut-over lands	216,355	598	8,618	2,922	14,294	8,150	3,667	1,163	6,605	632
Non-forested lands	120,838	5,994	43,097	7,803	137,673	628,246	239,822	453,849	10,512	8,541
TOTAL AREA BURNED	453,737	7,746	159,471	18,007	283,758	1,174,174	503,029	836,278	205,197	28,124
Average fire size (in acres)	236	7	420	50	1,245	2,553	1,413	1,439	146	15
DAMAGE	\$3,059,330	\$177,131	\$1,795,447	\$ 143,903	\$486,764	\$ 727,632	\$ 985,126	\$ 880,660	\$4,093,391	\$ 520,088
ACTUAL FIRE-FIGHTING COST	\$1,682,113	\$121,645	\$ 934,229	\$ 997,974	\$322,929	\$1,165,762	\$ 209,012	\$ 302,152	\$1,269,210	\$ 723,587
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$4,741,443	\$298,776	\$2,729,676	\$1,141,877	\$809,693	\$1,893,394	\$1,194,138	\$1,182,812	\$5,362,601	\$1,243,675

(Continued)

TABLE 7 (Continued)
STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1954-63

	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964
FIRES								
Total number	811	1,157	272	512	374	552	196	131
Caused by lightning (per cent)	18.8	34.7	9.2	3.5	1.1	2.7	3.1	17.6
AREA BURNED (in acres)								
Merchantable timber	47,694	18,182	3,578	317	1,522	1,317	28,584	71,200
Young growth	31,405	19,943	3,479	1,561	1,612	1,119	13,894	657
Cut-over lands	51,356	17,152	2,341	1,120	588	272	12,451	65
Non-forested lands	28,492	15,841	3,249	2,772	3,831	6,031	66,542	286,293
TOTAL AREA BURNED	158,947	71,118	12,647	5,770	7,553	8,739	121,471	358,215
Average fire size (in acres)	196	61	46	11	20	16	620	2,734
DAMAGE	\$1,561,704	\$1,436,463	\$148,020	\$68,855	\$76,055	\$25,336	\$816,549	\$1,610,170
ACTUAL FIRE-FIGHTING COST	\$ 885,146	\$ 563,107	\$ 58,947	\$27,854	\$30,854	\$33,868	\$122,897	\$ 148,319
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$2,446,850	\$1,999,570	\$206,967	\$96,729	\$106,909	\$59,204	\$939,446	\$1,758,489

(Continued)

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year period 1954-63

TABLE 7 (Concluded)

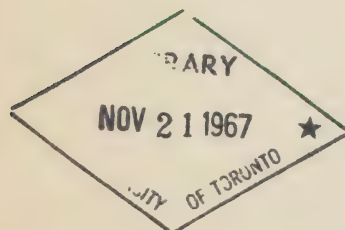
	Federal lands							
	National Parks		Other Federal lands		Yukon		Northwest Territories	
	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964	Annual Average 1954-63	Year 1964
FIRES								
Total number	36	25	19	19	62	25	78	162
Caused by lightning (per cent)	26.0	20.0	2.1	10.5	23.8	12.0	44.1	66.0
AREA BURNED (in acres)								
Merchantable timber	925	44	43	382	22,191	177	32,946	197,354
Young growth	2,160	12,773	16	2	46,781	6	35,840	46,540
Cut-over lands	367	-	23	4	420	-	131	4
Non-forested lands	2,547	2	527	948	121,802	297	215,496	226,586
TOTAL AREA BURNED	5,999	12,819	609	1,336	191,194	480	284,413	470,484
Average fire size (in acres)	167	513	32	70	3,084	19	3,646	2,904
DAMAGE								
	\$12,211	\$28,566	\$ 664	\$25,664	\$234,506	\$ 899	\$335,708	\$ 877,570
ACTUAL FIRE-FIGHTING COST	\$28,114	\$21,136	\$1,931	\$ 6,340	\$ 41,886	\$3,120	\$ 74,342	\$ 315,167
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$40,325	\$49,702	\$2,595	\$32,004	\$276,392	\$4,019	\$410,050	\$1,192,737

FOREST FIRE LOSSES IN CANADA 1965

by
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CANADA
DEPARTMENT OF FORESTRY
AND RURAL DEVELOPMENT



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FOREST FIRE LOSSES IN CANADA

1965

INTRODUCTION

This year's report outlines the main characteristics of the 1965 forest fire season and also carries a special report on the effectiveness of fire control procedures by comparing the costs of fire control with the results obtained. Analyses presented in previous reports are still valid and are not repeated in this issue.

HIGHLIGHTS OF THE 1965 FIRE SEASON

The 493,269 acres of burned-area in the provinces in 1965 is only about 23 per cent of the preceding 10-year average of 2,138,221 acres, and is substantially less than for some of the most devastating single fires on record.

The extraordinary severity of the fire season in Nova Scotia and New Brunswick is notable. In May, Nova Scotia reported the driest January to April period since meteorological records began in 1868 and by the end of May, 422 fires, or 54 per cent of the season's total, had already burned 69 per cent of the total area burned. The early season drought continued through the summer with monthly precipitation fluctuating between 25 and 70 per cent of normal.

By the end of the fire season New Brunswick and Nova Scotia had reported 743 and 783 fires respectively — about twice as many as the previous 10-year average and an all-time record.

Despite the handicaps of weather severity and fire occurrence load, losses for these two provinces were held to levels lower than that for the early 1960's, and damage was far below that of their worst season, 1944.

On the basis of monthly reviews of temperature and precipitation* the severity of the fire season in Quebec, Ontario and the Prairie Provinces was less than average. Burned area was also down in these provinces, and was, without exception, less than 50 per cent of the averages for the previous 10 years. In Saskatchewan the total burned area was the third lowest on record, surpassed only in 1934 and 1959.

The experience in British Columbia paralleled that of Nova Scotia and New Brunswick. June and July were both very warm and dry, especially July during which 1,001 fires (37 per cent of the season's total) burned 147,850 acres.

In addition to this early season weather severity, the fire load situation was aggravated by the fact that 63.7 per cent of the total number of lightning fires in the provinces occurred in British Columbia. These lightning fires, typically occurring in less accessible areas, accounted for 77.4 per cent of the area burned by lightning-caused fires (see Figures 1 and 2). As an anticlimax, wet fall weather permitted the early closing of the British Columbia fire season.

FIRE CONTROL COSTS AND ESTIMATED RESULTS (PROVINCES)

An interesting comparison can be made between annual expenditures on fire control and the apparent results obtained from estimated trends in forest fire activity.

*Weatherwise, Vol. 18, Nos. 3 to 6. Amer. Meteorol. Soc., 45 Beacon Street, Boston, Mass.

On the cost side, annual expenditures on capital maintenance and overhead have risen to about \$25 million (1957 dollars) from about \$15 million in the early 1940's. To this must be added additional costs which are chargeable to individual fires. These costs have varied from \$2.5 million for the period 1945 to 1954 to almost \$6 million for 1955 to 1964, depending on the severity of the fire season. On the whole, total fire fighting costs per year have doubled in the past 20 years.

Capital expenditures, as an item separate from other expenditures, are not known but would be a valuable addition to the knowledge of costs, since these expenditures would represent annual accumulations to fire fighting capital in its various forms.

A tabular analysis of curved data read from Figures 3 to 6 is presented here. It must be kept in mind that the protected area is increasing, though the increase from 1955 to 1965 was insignificant.

**Shifts in Forest Fire Patterns
(Estimated from Figures 2 to 5)**

Size Class in Acres	1935	1945	Shift	1945	1955	Shift	1955	1965	Shift
<¼	1450	1600	+150	1600	2200	+600	2200	3600	+1400
¼ to 10	1950	2000	+ 50	2000	2150	+150	2150	2350	+ 200
11 to 500	1700	1200	-500	1200	900	-300	900	700	- 200
500+	370	280	- 90	280	200	- 80	200	160	- 40
Total	5470	5080	-390	5080	5450	+370	5450	6810	+1360

The use of the tabular results should be clarified on two points. First, there is a large variation in the actual data about the trend curve estimates of fire frequency. Consequently, the point estimates from the curve cannot be taken as representative of any given year. The second consideration, which is also a result of wide variation about the trend estimate, is that consecutive 10-year intervals cannot be compared with a high degree of confidence.

Several measures reflecting the effectiveness of fire control can be abstracted from the graphical and tabular analysis.

1. Fire occurrence level has increased by about 30 to 35 per cent from 1945 to 1965. About 25 per cent of this increase occurred between 1955 and 1965. Part of this increase in fire occurrence is due to a general rise in the recreational use of forests by an expanding and increasingly urban population.
2. Despite the increase in total fire occurrence, the shift in numbers of fires into the small size classes shows that most of these fires have been kept small. There has also been a gratifying decrease in the numbers of fires in the 500-acres-and-greater size class from about 30 to 40 per cent from 1945 to 1965 to about 25 per cent from 1955 to 1965.

Fires in the 500-acre-and-greater class account for most of the burned area and damages, so a slight decrease of numbers of fires in this class is very significant in evaluating the results of fire control activity.

3. Numbers of fires in the less-than-¼-acre class have increased by 125 per cent from 1945 to 1965. About 64 per cent of this increase occurred from 1955 to 1965.
4. The number of fires greater than 11 acres has been reduced by approximately 40 per cent.

Up to this point, the analysis has been concerned only with the effectiveness of suppression activities rather than both prevention and suppression. Unfortunately, so little quantitative information is available on the patterns of forest use in Canada that the task of estimating the degree to which the trend in man-caused fire frequency is a result of inadequate prevention or of increased public use of our forest, cannot be estimated with confidence.

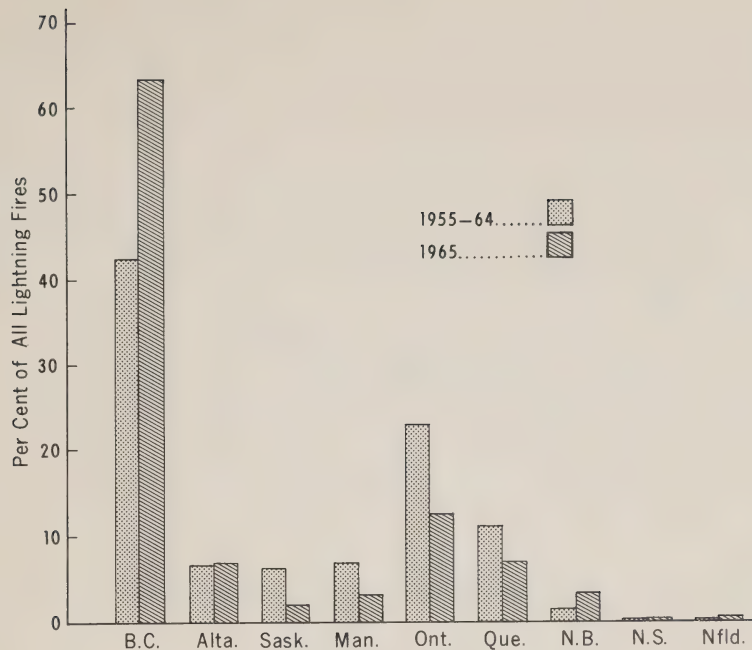


Figure 1. Incidence of lightning fires (excluding Yukon and Northwest Territories).

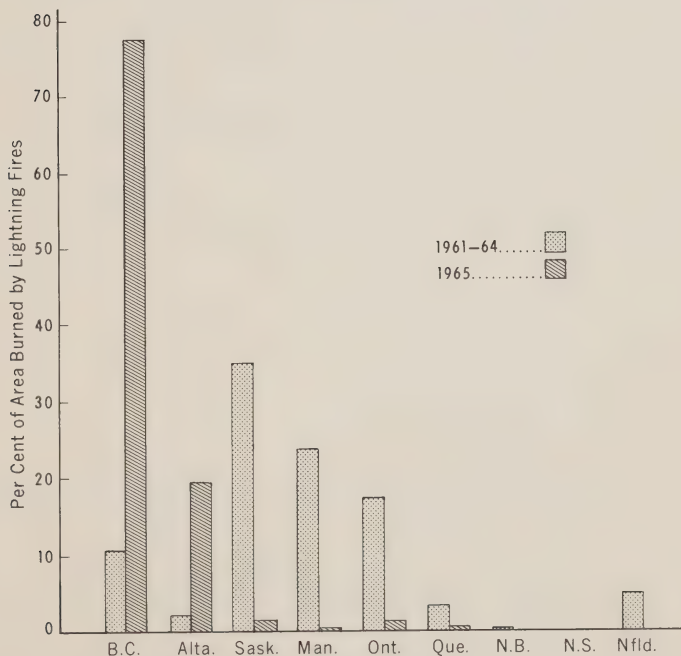


Figure 2. Proportion of area burned by lightning fires (excluding Yukon and Northwest Territories).

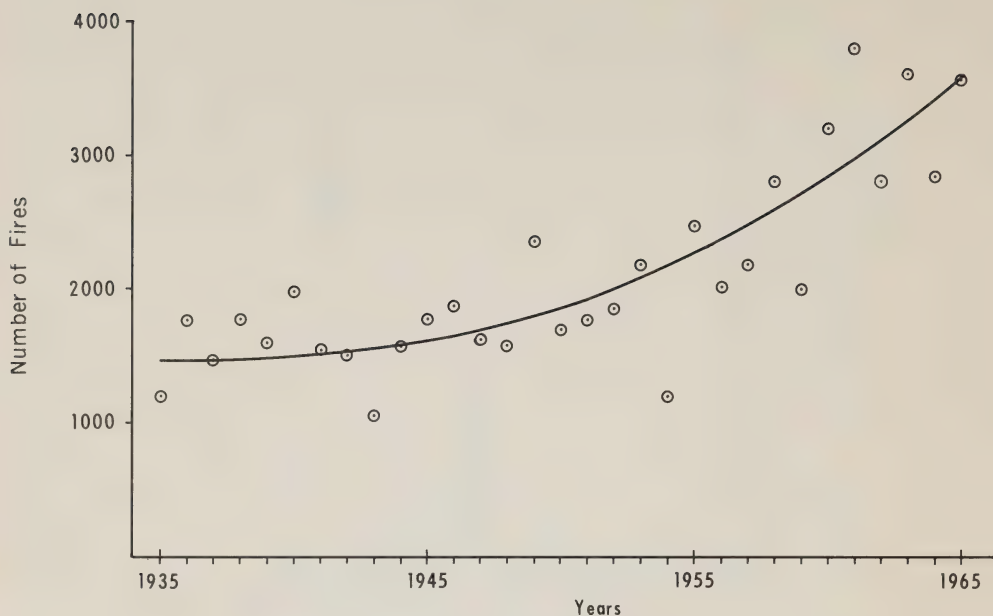


Figure 3. Number of fires less than $\frac{1}{4}$ acre (1935-1965).

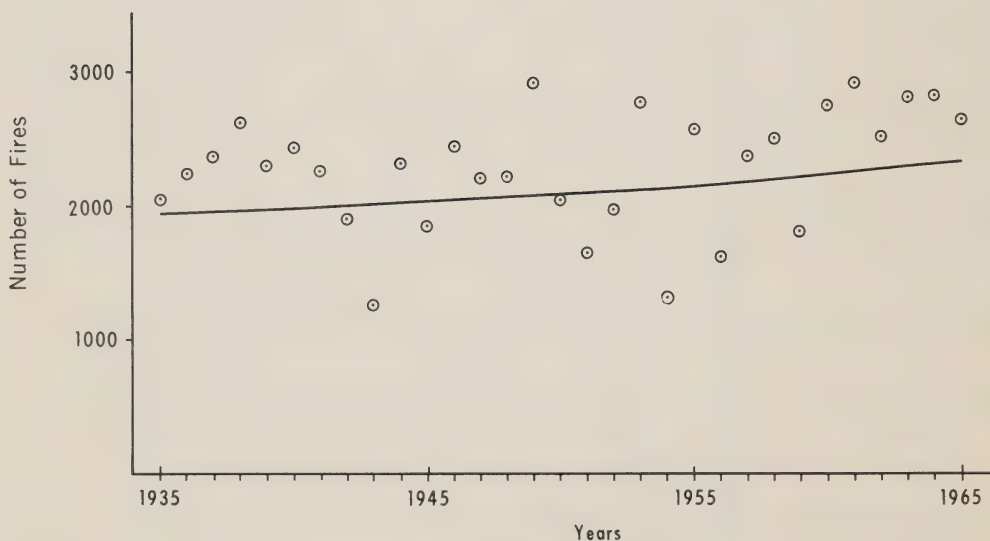


Figure 4. Number of fires between $\frac{1}{4}$ acre and 10 acres (1935-1965).

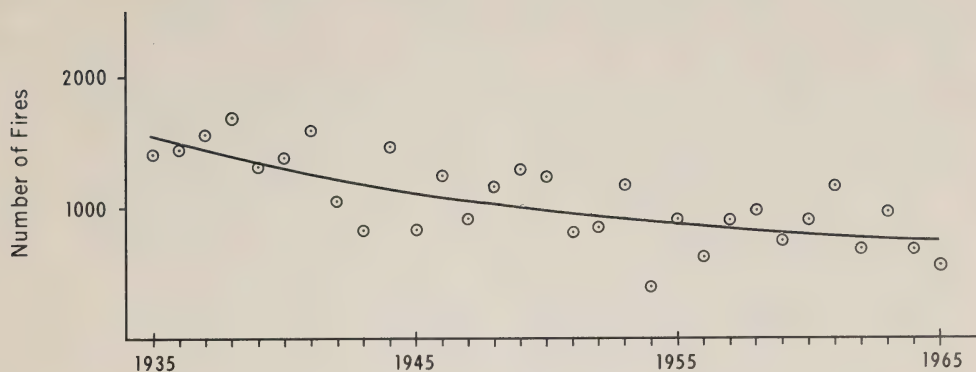


Figure 5. Number of fires between 11 and 500 acres (1935-1965).

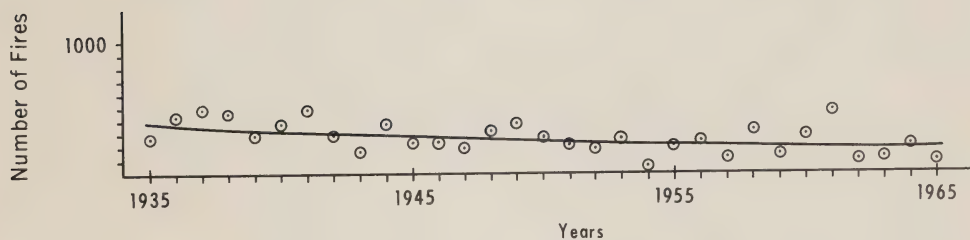


Figure 6. Number of fires greater than 500 acres (1935-1965).

SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

TABLE 1

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965
TOTAL NUMBER OF FIRES	6,383	7,054	59	75	89	109
AREA BURNED (acres)						
Merchantable timber	553,103	127,184	21,949	7,822	52,169	2,184
Young growth	479,451	142,305	46,580	5,793	31,342	4,890
Cut-over lands	317,329	38,365	420	83	131	907
Non-forested lands	788,338	185,415	121,582	4,977	135,372	1,223
TOTAL AREA BURNED (acres)	2,138,221	493,269	190,531	18,675	219,014	9,204
MERCHANTABLE TIMBER BURNED						
Saw Timber (M. ft. B.M.)	1,351,591	467,684	1,150	6,577	8,524	422
Small material (cords)	2,813,693 ²	441,654	65,134	39,793	240,567	14,158
ESTIMATED VALUES DESTROYED³						
Merchantable timber	\$ 9,317,083	\$ 4,077,760	\$125,354	\$ 24,812	\$303,922	\$ 14,854
Young growth	2,590,796	2,813,623	89,879	12,385	61,045	9,779
Cut-over lands	434,973	255,630	420	82	131	501
Non-forested lands	158,024	90,356	1,539	1,243	31,702	306
Wood in process	210,185	369,880	—	—	—	—
Other property	721,301	634,299	15,933	9,036	244	—
TOTAL DAMAGE	\$13,432,362	\$ 8,241,548	\$233,125	\$ 47,558	\$397,044	\$ 25,440
FIRE CONTROL COSTS						
Actual fire fighting	\$ 5,863,479	\$ 6,201,482	\$ 40,907	\$142,088	\$103,358	\$ 85,732
Capital, maintenance and overhead	24,863,330	27,000,000 ⁴	190,872	365,000	215,955	256,169
TOTAL DAMAGE AND ACTUAL FIRE FIGHTING COST	\$19,295,841	\$14,443,030	\$274,032	\$189,646	\$500,402	\$111,172
TOTAL DAMAGE AND FIRE CONTROL COSTS	\$44,159,171	\$41,500,000 ⁵	\$464,904	\$554,646	\$716,357	\$367,341

SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

TABLE 1 (Cont.)

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965
NUMBER OF FOREST FIRES						
BY SIZE CLASS						
Under ¼ acre	2,786	3,573	28	43	16	28
¼ to 10 acres	2,484	2,654	12	17	32	57
11 to 100 acres	654	554	5	4	15	13
101 to 500 acres	235	181	3	4	7	7
Over 500 acres	224	92	11	7	19	4
TOTAL NUMBER OF FIRES	6,383	7,054	59	75	89	109
AREA BURNED BY SIZE CLASS						
Under ¼ acre	—	301	—	6	—	—
¼ to 10 acres	—	8,607	—	47	—	187
11 to 100 acres	—	20,911	—	187	—	543
101 to 500 acres	—	56,166	—	1,335	—	2,594
Over 500 acres	—	407,284	—	17,100	—	5,880
TOTAL AREA BURNED (acres)	2,138,221	493,269	190,531	18,675	219,014	9,204
AVERAGE FIRE SIZE (acres)	335	70	3,229	249	2,461	84
AREA UNDER PROTECTION (in sq. miles)		1,354,369		40,000		95,000

¹ Includes federal lands within provincial boundaries

² Weighted average. Province of Quebec figures not available for 1 year out of the 10-year period.

³ Wood values are based on prevailing stumpage rates only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

⁴ Estimated. (Actual expenditures for year 1964: \$25,836,306)

⁵ Estimated.

TABLE 2
FOREST FIRES BY CAUSES
Compared with Averages for Previous Four Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-64		Year 1965		Annual Average 1961-64		Year 1965		Annual Average 1961-64		Year 1965	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreation	1,703	24	1,645	23	12	29	18	24	18	15	27	25
Settlement	859	12	854	12	7	17	6	8	4	3	3	3
Woods Operations	196	3	388	6	1	3	—	—	1	1	1	1
Railroads	246	3	346	5	—	—	—	—	—	—	—	—
Other Industries	308	4	309	4	3	7	5	7	13	11	8	7
Incendiary	322	4	318	5	1	3	2	3	—	—	—	—
Misc. Known	1,109	15	1,291	18	5	12	19	25	5	4	18	16
Unknown	345	5	328	5	4	10	9	12	11	9	23	21
TOTAL MAN CAUSED	5,088	70	5,479	78	33	81	59	79	52	43	80	73
LIGHTNING	2,139	30	1,575	22	8	19	16	21	68	57	29	27
TOTAL	7,227	100	7,054	100	41	100	75	100	120	100	109	100

¹ Includes federal lands within provincial boundaries.

TABLE 3

AREA BURNED BY CAUSES
Compared with Averages for Previous Four Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-64		Year 1965		Annual Average 1961-64		Year 1965		Annual Average 1961-64		Year 1965	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Recreation	349,325	12	66,747	14	23	-	1,117	6	3,175	1	90	1
Settlement	572,617	19	37,349	8	25	-	454	2	3	-	4	-
Woods Operations	186,489	6	54,135	11	1	-	-	-	1	-	150	2
Railroads	7,541	-	7,384	2	-	-	-	-	-	-	-	-
Other Industries	87,207	3	6,257	1	203	1	457	2	3,567	1	95	1
Incendiary	43,052	1	16,257	3	-	-	1	-	-	-	-	-
Misc. Known	45,762	2	16,342	3	1	-	7	-	70	-	686	7
Unknown	39,649	1	11,038	2	4,916	15	1,201	7	9,853	3	1,466	16
TOTAL MAN CAUSED	1,331,642	44	215,509	44	5,169	16	3,237	17	16,669	5	2,491	27
LIGHTNING	1,727,890	56	277,760	56	26,654	84	15,438	83	302,065	95	6,713	73
TOTAL	3,059,532	100	493,269	100	31,823	100	18,675	100	318,734	100	9,204	100

¹ Includes federal lands within provincial boundaries

TABLE 4
FOREST FIRES BY MONTHS
Compared with 10-Year Average

Month	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1955-64		Year 1965		Annual Average 1955-64		Year 1965		Annual Average 1955-64		Year 1965	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
January	4	—	1	—	—	—	—	—	—	—	—	—
February	3	—	2	—	—	—	—	—	—	—	—	—
March	39	1	52	1	1	2	—	—	—	—	—	—
April	476	7	436	6	2	3	1	1	1	1	—	—
May	1,396	22	1,764	25	9	15	9	12	6	7	13	12
June	1,071	17	1,465	21	16	27	14	19	24	27	9	8
July	1,543	24	1,736	24	15	25	22	29	43	48	46	42
August	1,182	18	1,110	16	10	17	25	34	13	15	24	22
September	377	6	348	5	3	5	3	4	2	2	15	14
October	240	4	113	2	1	2	1	1	—	—	2	2
November	45	1	24	—	1	2	—	—	—	—	—	—
December	7	—	3	—	1	2	—	—	—	—	—	—
TOTAL	6,383	100	7,054	100	59	100	75	100	89	100	109	100

¹ Includes federal lands within provincial boundaries.

AREA BURNED BY MONTHS
Compared with Averages for Previous Eight Years

TABLE 5

Month	Provinces ¹			Yukon			Northwest Territories		
	Annual Average 1957-64		Year 1965	Annual Average 1957-64		Year 1965	Average Annual 1957-64		Year 1965
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Per Cent
January	-	-	-	-	-	-	-	-	-
February	23	-	-	-	-	-	-	-	-
March	311	-	5,548	1	-	-	-	-	-
April	19,789	1	16,002	3	4	-	-	-	-
May	411,168	18	49,988	10	5,007	2	1,726	1	69
June	761,460	34	67,705	14	42,297	18	44,671	19	269
July	569,141	25	215,508	44	162,056	70	139,351	58	5,811
August	416,573	19	89,157	18	21,877	9	52,668	22	2,987
September	33,071	1	37,959	8	1,374	1	11	-	68
October	35,727	2	11,246	2	-	-	-	-	-
November	1,546	-	154	-	-	-	-	-	-
December	5	-	2	-	40	-	-	-	-
TOTAL	2,248,823	100	493,269	100	232,655	100	238,427	100	9,204
					18,675	100			100

¹ Includes federal lands within provincial boundaries.

LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

TABLE 6

Provinces	Proceeding Under Fire Laws						Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions			
	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965
British Columbia	53.5	30	48.4	29	.90	.97	1.7	0
Alberta	67.5	16	63.0	16	.93	1.00	0.3	0
Saskatchewan	11.3	3	10.5	3	.93	1.00	0.0	0
Manitoba	8.2	1	7.0	1	.85	1.00	0.5	0
Ontario	55.8	37	49.6	34	.89	.92	0.4	0
Quebec	74.4	124	71.0	121	.95	.97	0.0	0
New Brunswick	20.1	53	19.9	45	.99	.85	0.1	0
Nova Scotia	9.2	9	9.1	9	.99	1.00	0.0	0
Newfoundland	9.4	16	9.1	11	.97	.69	0.0	1
Yukon	1.4	2	1.2	2	.86	1.00	0.0	0
Northwest Territories	0.9	0	0.6	0	.67	—	0.0	0
Other Federal Lands	0.6	0	0.6	0	1.00	—	0.0	0
TOTAL	312.3	291	290.0	271	.93	.93	3.0	1

TABLE 7

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-Year Period 1955-64

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965
FIRES										
Total Number	1,963	2,685	408	252	268	123	402	225	1,502	1,218
Caused by lightning (Per Cent)	36.6	37.2	29.4	45.2	41.4	22.8	30.3	22.7	26.1	16.6
AREA BURNED (acres)										
Merchantable timber	59,010	66,521	51,961	30,159	30,908	32	172,971	424	146,948	10,430
Young growth	57,409	88,746	50,744	17,274	154,516	5,608	124,401	1,779	39,879	294
Cut-over lands	216,317	10,595	8,903	2,336	15,098	23	3,778	1,446	4,846	6,377
Non-forested lands	120,745	141,270	36,776	4,565	200,273	4,094	284,920	13,123	10,867	2,803
TOTAL AREA BURNED (acres)	453,481	307,132	148,384	54,334	400,795	9,757	586,070	16,752	202,540	19,904
Average fire size (acres)	231	114	364	216	1,495	79	1,458	74	135	16
DAMAGE										
	\$3,059,555	\$5,761,635	\$1,704,122	\$757,497	\$559,186	\$ 6,275	\$1,072,426	\$20,770	\$4,118,926	\$ 640,956
ACTUAL FIRE-FIGHTING COST	\$1,691,171	\$2,560,000	\$1,026,438	\$1,215,931	\$438,305	\$352,820	\$ 238,127	\$56,138	\$1,271,121	\$ 527,273
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$4,750,726	\$8,321,635	\$2,730,560	\$1,973,428	\$997,491	\$359,095	\$1,310,553	\$76,908	\$5,390,047	\$1,168,229

TABLE 7 (Continued)
STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1955-64

	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965
FIRES								
Total number	887	746	304	743	394	783	199	239
Caused by lightning (per cent)	21.3	15.0	8.7	7.3	1.4	0.8	4.1	0.8
AREA BURNED (acres)								
Merchantable timber	49,366	3,549	3,587	13,753	1,640	2,288	35,704	31
Young growth	29,916	22,689	3,599	1,898	1,599	3,792	13,947	214
Cut-over lands	52,739	13,719	2,414	2,491	558	984	12,308	263
Non-forested lands	28,841	3,630	3,424	3,392	4,188	7,802	95,150	1,654
TOTAL AREA BURNED (acres)	160,862	43,587	13,024	21,534	7,985	14,866	157,109	2,162
Average fire size (acres)	181	58	43	29	20	19	789	9
DAMAGE								
	\$1,697,414	\$ 529,841	\$153,254	\$ 466,814	\$ 74,455	\$ 51,610	\$ 974,831	\$2,119
ACTUAL FIRE-FIGHTING COST	\$ 933,417	\$ 749,986	\$ 61,408	\$ 575,788	\$ 33,228	\$105,242	\$ 137,627	\$5,100
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$2,630,831	\$1,279,827	\$214,662	\$1,042,602	\$107,683	\$156,852	\$1,112,458	\$7,219

TABLE 7 (Concluded)

STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-year Period 1955-64

	Federal lands							
	National Parks		Other Federal Lands		Yukon		Northwest Territories	
	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965	Annual Average 1955-64	Year 1965
FIRES								
Total number	37	18	19	22	59	75	89	109
Caused by lightning (per cent)	26.1	22.2	3.2	9.1	23.8	21.3	50.2	26.6
AREA BURNED (acres)								
Merchantable timber	927	—	81	17	21,949	7,822	52,169	2,184
Young growth	3,427	1	14	10	46,580	5,793	31,342	4,890
Cut-over lands	367	—	1	131	420	83	131	907
Non-forested lands	2,545	837	609	2,245	121,582	4,977	135,372	1,223
TOTAL AREA BURNED (acres)	7,266	838	705	2,403	190,531	18,675	219,014	9,204
Average fire size (acres)	20	47	37	109	3,229	249	2,461	84
DAMAGE								
	\$15,050	\$ 10	\$3,143	\$ 4,021	\$233,125	\$ 47,558	\$397,044	\$ 25,440
ACTUAL FIRE-FIGHTING COST								
	\$30,102	\$3,979	\$2,535	\$49,225	\$ 40,907	\$142,088	\$103,358	\$ 85,732
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST								
	\$45,152	\$3,989	\$5,678	\$53,246	\$274,032	\$189,646	\$500,402	\$111,172



FOREST FIRE RESEARCH INSTITUTE

DEPARTMENT OF FORESTRY AND RURAL DEVELOPMENT

November 1967

SUMMARY OF FOREST FIRE LOSSES IN CANADA, 1966

In an effort to satisfy the demand for early dissemination of our national statistics on forest fire losses, this format is used for limited distribution. Nevertheless, our annual publication "Forest Fire Losses in Canada", complete with an outline of the main characteristics of the 1966 fire season and an analysis of one specific aspect of the fire control problem, will be available for distribution early in the coming year.

A brief review of available data on the 1966 forest fire season in the provinces indicates that a combination of favourable weather conditions and increased efficiency in fire prevention and control techniques have resulted in the easiest fire season on record. Although a total of 7,117 fires were reported the total area burned, in the nine provinces for which figures are available (P.E.I. does not report fire losses), is a record low: 210,450 acres or about one tenth the annual average for the ten-year period 1956-65.

As shown in Table 2 human carelessness was again the principal cause of forest fires in 1966. A total of 5,616 fires or 72 per cent of all forest fires reported in the provinces were attributed to man; careless recreationist and settlers alone accounting for almost half this total. On the other hand, lightning, the only cause not subject to human control ignited some 1500 fires. This single cause, however, accounted for 128,490 acres destroyed or about 60 per cent of the provincial total.

Monthly statistics of acreage burned (Table 3) indicate that June was by far the most devastating month of the fire season. A total of 131,870 acres were destroyed or almost twice the acreage for all other months combined. A regional breakdown of some of the main categories of forest fire statistics is given in Tables 4 and 5.

Table 1

SUMMARY OF FOREST FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

	Provinces ¹		Yukon and Northwest Territories	
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
Total Number of Fires	6,469	7,117	151	351
Area Burned (in acres)				
Merchantable Timber	531,367	28,740	74,652	223,780
Young Growth	446,744	83,137	73,488	311,316
Other Protected Lands	1,071,917	98,573	240,755	398,893
Total Area	2,050,028	210,450	388,895	933,989
Merchantable Timber Burned				
Total Volume (M. Cu. Ft.)	496,330	29,968	27,933	194,711
Estimated Values Destroyed ²				
Merchantable Timber	9,292,319	623,466	417,305	550,621
Young Growth	2,756,440	1,631,257	142,136	554,744
Other Protected Lands	597,498	81,063	30,404	102,481
Other Property Burned	867,075	411,442	16,935	15,209
Total Damage	13,513,332	2,747,228	606,780	1,223,055
Actual Fire-Fighting Cost	5,809,992	5,844,238	156,022	964,674
Total Damage and Fire-Fighting Cost	19,323,324	8,591,466	762,802	2,187,729

¹ Includes federal lands within provincial boundaries

² Wood values are based on prevailing stump age rates only

Table 2

FOREST FIRE LOSSES BY CAUSES - 1966

Causes	Provinces ¹		Yukon and Northwest Territories	
	Number of Fires	Acres Burned	Number of Fires	Acres Burned
Recreation	1,769	12,693	40	1,026
Settlement	879	31,069	6	51
Woods Operations	341	12,634	-	-
Railroads	419	1,487	-	-
Other Industries	358	8,286	26	14,126
Incendiary	280	5,038	-	-
Misc. Known	1,177	8,332	27	5,579
Unknown	393	2,421	67	391,824
Total Man-Caused	5,616	81,960	166	412,606
Lightning	1,501	128,490	185	521,383
TOTAL	7,117	210,450	351	933,989

¹ Includes federal lands within provincial boundaries.

Table 3

FOREST FIRE LOSSES BY MONTHS - 1966

Months	Provinces ¹		Yukon and Northwest Territories	
	Number of Fires	Acres Burned	Number of Fires	Acres Burned
January	-	-	-	-
February	-	-	-	-
March	41	755	1	-
April	722	4,231	1	-
May	1,442	36,580	19	206
June	1,032	131,870	161	539,373
July	1,993	20,254	93	371,181
August	1,100	6,649	62	22,979
September	559	5,241	14	250
October	214	4,863	-	-
November	12	4	-	-
December	2	3	-	-
TOTAL	7,117	210,450	351	933,989

¹ Includes federal lands within provincial boundaries.

Table 4

LEGAL ACTIONS AND FATALITIES - 1966
Comparative Statements by Regions

Provinces	Proceedings Under Fire Laws		
	Number of Prosecutions	Number of Convictions	Number of Fatalities
British Columbia	31	26	0
Alberta	29	18	0
Saskatchewan	1	0	0
Manitoba	1	1	0
Ontario	28	26	0
Quebec	92	92	0
New Brunswick	29	26	0
Nova Scotia	18	18	0
Newfoundland	8	7	0
Yukon	4	4	0
Northwest Territories	0	0	0
Other Federal Lands	0	0	0
TOTAL	241	218	0

Table 5

SUMMARY OF FOREST FIRE LOSSES - 1966

BY REGIONS

Provinces	Number of Fires	Acres Burned	Damage	Actual Fire- Fighting Costs
British Columbia	1,967	54,788	\$ 921,369	\$ 1,383,400
Alberta	371	69,950	554,300	2,209,725
Saskatchewan	216	33,201	661,895	477,318
Manitoba	235	6,154	8,205	139,036
Ontario	1,921	14,415	120,979	641,663
Quebec	732	20,451	413,895	812,144
New Brunswick	639	4,224	59,579	141,320
Nova Scotia	817	2,812	5,158	21,379
Newfoundland	157	4,273	1,830	10,400
Yukon	103	393,048	281,096	595,816
Northwest Territories	248	540,941	941,959	368,858
Other Federal Lands	62	182	18	7,853
TOTAL	7,468	1,144,439	\$ 3,970,283	\$ 6,808,912

FOREST FIRE LOSSES IN CANADA 1966

by

D. L. McLean and M. R. Lockman



CANADA
DEPARTMENT OF FORESTRY
AND RURAL DEVELOPMENT



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FOREST FIRE LOSSES IN CANADA

1966

HIGHLIGHTS OF 1966 SEASON

The year 1966 was not one of large fires in the provinces. From the point of view of area burned, one can only conclude that 1966 was a most "favourable" fire season. The 210,450 acres burned in the provinces is the lowest figure ever recorded, and the corresponding burned area for each of the provinces is only a fraction of the preceding 10-year averages. It is interesting to note, however, that the fires responsible for 63 per cent of this burned area occurred in June. In fact, in all provinces but Quebec and Ontario, June was the most severe month in terms of area burned.

From the point of view of fire control costs, however, 1966 was not a "mild" fire season. Some \$36.3 million was expended on the control of 7,117 fires. About 85 per cent of this cost is not directly related to weather severity and the difficulty of controlling fires, but is for the maintenance of permanent fire control organizations.

A BRIEF REGIONAL REVIEW OF FOREST FIRE LOSSES IN 1966

The Yukon and Northwest Territories

A very severe fire situation developed in the Northwest Territories and in the Yukon. In both these regions there has been a major increase in man-caused fires during the past few years and in 1966 there were about three times as many occurrences as the previous 10-year average.

These fires, and especially those in the unusually dry months of June and July, burned 934,000 acres - about double the average for the previous 10 years.

The Atlantic Provinces

In New Brunswick and Nova Scotia 1966 was a year of increased fire occurrence, several months of less than normal precipitation, and yet a burned area of approximately one-third of the average for the previous 10 years.

On the basis of monthly weather summaries from Newfoundland, their 1966 season was dominated by greater than normal precipitation.

Some 4,273 acres were burned over by 157 fires. Over 75 per cent of this area was burned in Labrador during the month of June.

The Central Provinces

In Quebec, the fire season, in terms of weather, was confined to the months of June and July. The total number of fires (732), slightly less than the 10-year average, burned 20,451 acres. This area is one of the lowest on record.

A record number of fires occurred in Ontario during July; 908 fires, mainly caused by smokers and lightning, combined with the warmest and driest month of the year, were attacked by the Forest Protection Branch and resulted in a minimal 2,671 acres burned.

Fires during the months of May and June were of little consequence.

The Prairie Provinces

Fire occurrence, area burned, and losses were all below average for Manitoba and Saskatchewan. In Alberta a build-up of fire hazard occurred during June and 83 per cent of the year's losses (69,950 acres) occurred during that month.

British Columbia

The British Columbia Forest Service Annual Report summarizes the 1966 fire season weather as follows:

'Apart from a few weeks early in July when the Prince Rupert Forest District suffered severe danger, and from late July to early August when the southern interior of the province had a build-up, there was no prolonged fire situation.'

Of key importance in keeping area burned down to 54,788 acres, was the decreased numbers of fires started by lightning. There were, in fact, only 374 lightning fires as compared to the 10-year average of 777.

REGIONAL DISTRIBUTION OF LIGHTNING FIRES

One controversial issue of conservation and public expenditure has its origin in the lightning-caused fire. Should the policy of spending great sums of money on fighting going fires in our northern forest districts be continued, or should the even more costly alternative of extending facilities for early detection and suppression of these fires in their embryonic stage be considered? From the point of view of the values at

stake, and the results that could be obtained, should any money be expended on detection and suppression of these fires at all?

At the operational level, lightning fires are Canada's number one forest fire suppression problem. They are usually accompanied by enough rain to prevent their spread, but an occasional "dry thunderstorm" can hopelessly overtax a suppression organization by simultaneously starting dozens of fires under hazardous burning conditions. They frequently occur in inaccessible portions of forest districts where costly airlifts of men and facilities compete with the aircraft's role of water-bombing. They often smoulder in the dry litter beneath the lightning-struck tree or in the dry wood of a dead tree for periods of several days, and by then the increased fire hazard permits their rapid spread. They are costly; they are perplexing; they are a nuisance.

Analysis of fire loss statistics can bring valuable information to bear on the regional distribution of the lightning fire problem. In which regions of Canada are lightning fires most frequent? In which regions do they burn the greatest areas? How has occurrence and area burned in each of these regions varied in past years? Broad-scale information of this type can augment more intensive studies in lightning physics, and local lightning occurrence patterns already undertaken in both the United States and Canada.

Canada can be divided into five regions of broad similarity between forest types and general accessibility:

- | | |
|----------------------------|---------------------------------------|
| 1. Maritime Region | - Nova Scotia and New Brunswick. |
| 2. Newfoundland Region | - Newfoundland. |
| 3. Central Region | - Quebec and Ontario. |
| 4. Prairie Region | - Manitoba, Saskatchewan and Alberta. |
| 5. British Columbia Region | - British Columbia. |

Now, returning to the question of fire frequency by Region, the pattern shown in Table I (see page 4) emerges.

The total number of lightning fires in the provinces has varied from an all time high of 2,787 in 1961 to a low of 1,493 in 1966. On the basis of a 6-year average, lightning fire frequency in British Columbia is about twice that in the three Prairie provinces, and after correcting for the difference in forested area involved, double the frequency of lightning fires in the two Central provinces. Newfoundland and the Maritime region have the lowest lightning fire frequency.

The general pattern of lightning fire occurrence then, is that about 40 per cent of the average annual number reported by all the provinces,

TABLE I. NUMBER OF FIRES BY REGIONS

Region	1961	1962	1963	1964	1965	1966	Annual Average 1961-66
Maritime							
From all causes	780	790	752	1074	1526	1456	1063
From lightning	81	12	43	33	60	76	51
% from lightning	10.4	1.5	5.7	3.1	3.9	5.2	4.8
Newfoundland							
From all causes	304	148	109	131	239	157	181
From lightning	10	13	6	23	2	5	10
% from lightning	3.3	8.8	5.5	17.6	.8	3.2	5.5
Central							
From all causes	2155	2770	3057	2986	1964	2653	2597
From lightning	567	596	607	993	314	806	647
% from lightning	26.3	21.5	19.9	33.3	16.0	30.4	24.9
Prairie							
From all causes	2025	852	1252	1402	600	822	1159
From lightning	703	326	494	546	193	232	416
% from lightning	34.7	38.3	39.5	38.9	32.2	28.2	35.9
British Columbia							
From all causes	3102	1536	2345	1120	2685	1967	2126
From lightning	1426	615	1144	277	1000	374	806
% from lightning	46.0	40.0	48.8	24.7	37.2	19.0	37.9
Total							
All causes	8366	6096	7515	6713	7014	7055	7126
From lightning	2787	1562	2294	1872	1569	1493	1930
% from lightning	33.3	25.6	30.5	27.9	22.4	21.2	27.1

occur in British Columbia; some 20 and 35 per cent, respectively, in the Prairie and Central regions; and the remainder, a total of about 5 per cent, in the Newfoundland and Maritime regions. In any one year, there can be a great variation in this pattern. In 1966, for example, 54 per cent of the lightning fires occurred in the Central region. Figures 1 and 2 illustrate the provincial distribution of lightning fires compared to the previous 10 years.

However, what happens after lightning fires start is of far greater importance than lightning occurrence alone. There is no "average" year for lightning-caused fire losses, only "favourable" years and "catastrophic" years. In 1961, for example, the combination of high fire danger

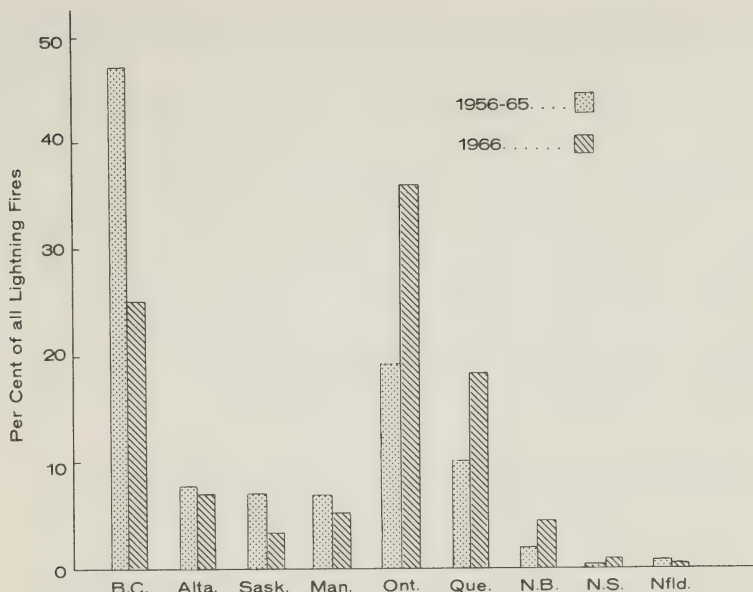


Figure 1. Incidence of lightning fires (Excluding Yukon and N.W.T.)

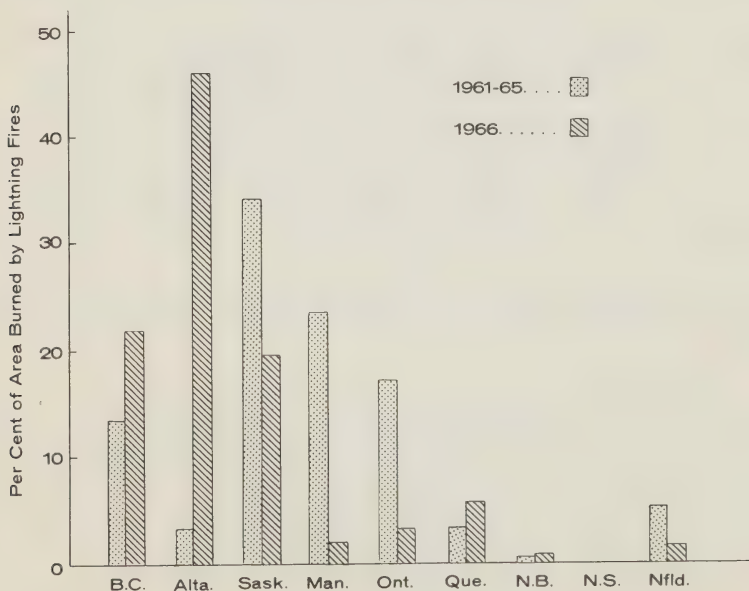


Figure 2. Proportion of area burned by lightning fires (Excluding Yukon and N.W.T.)

TABLE II. LIGHTNING FIRES - AREA BURNED (IN ACRES) AND NUMBER OF FIRES

Region	1961	1962	1963	1964	1965	1966	Average Size of Lightning Fires 1961-66
							Acres
Maritime							
Area burned	14,581	10	41	75	96	871	51
Number	81	12	43	33	60	76	
Newfoundland							
Area burned	19,831	21	37	356,000	1	1,759	6,401
Number	10	13	6	23	2	5	
Central							
Area burned	1,212,416	148,538	55,320	34,399	5,016	11,351	378
Number	567	596	607	993	314	806	
Prairie							
Area burned	2,471,434	145,788	148,977	1,535,941	57,651	86,438	1,781
Number	703	326	494	546	193	232	
British Columbia							
Area burned	727,435	8,710	16,873	530	214,992	28,066	206
Number	1,426	615	1,144	277	1,000	374	
Total							
Area burned	4,445,697	303,067	221,248	1,926,945	277,756	128,485	631
Number	2,787	1,562	2,294	1,872	1,569	1,493	

and a rash of lightning fires resulted in 4,445,697 acres destroyed in the provinces, or over half of the total area burned by lightning in the past six years.

From the planner's point of view, a vexing question is: what percentage of lightning and man-caused fires, should we have the capacity to take immediate action on during years of severe lightning fires? Extending facilities for early detection and suppression of all lightning fires in our forests would be extremely expensive with our present technology. On the other hand having these facilities on only half of the forested land in Canada will result in many lightning fires becoming uncontrollable and burning millions of acres during the "catastrophic" years.

FOREST FIRE STATISTICS

Table 1. Summary of forest-fire losses in Canada.

Table 2. Forest fires by causes.

Table 3. Area burned by causes.

Table 4. Forest fires by months.

Table 5. Area burned by months.

Table 6. Legal actions and fatalities.

Table 7. Statistics of forest fires by regions.

TABLE 1 - SUMMARY OF FOREST-FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
TOTAL NUMBER OF FIRES	6,469	7,117	59	103	92	248
AREA BURNED (acres)						
Merchantable timber	531,367	28,740	22,520	32,747	52,132	191,033
Young growth	446,744	83,137	47,103	76,245	26,385	235,071
Cut-over lands	293,106	17,344	227	-	222	1,292
Non-forested lands	778,811	81,229	118,415	284,056	121,891	113,545
TOTAL AREA BURNED (acres)	2,050,028	210,450	188,265	393,048	200,630	540,941
MERCHANTABLE TIMBER BURNED						
Saw timber (M.ft.B.M.)	1,374,546	43,643	1,806	25,769	6,012	83,988
Small material (cords)	2,604,951	249,872	68,242	1,322,401	241,982	710,069
ESTIMATED VALUES DESTROYED ²						
Merchantable timber	\$ 9,292,319	\$ 623,466	\$127,221	\$ 110,281	\$290,084	\$ 440,340
Young growth	2,756,441	1,631,257	91,005	84,602	51,131	470,142
Cut-over lands	432,291	72,252	227	-	181	1,292
Non-forested lands	165,207	8,811	1,664	71,004	28,332	30,185
Wood in process	190,182	240,053	-	-	-	-
Other property	676,892	171,389	16,692	15,209	243	-
TOTAL DAMAGE	\$13,513,332	\$ 2,747,228	\$236,809	\$ 281,096	\$369,971	\$ 941,959
FIRE CONTROL COSTS						
Actual fire-fighting	\$ 5,809,992	\$ 5,844,238	\$ 53,088	\$ 595,816	\$102,935	\$ 368,858
Capital, maintenance and overhead	25,707,901	30,500,000 ³	221,894	425,000	236,453	309,787
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$19,323,324	\$ 8,591,466	\$289,897	\$ 876,912	\$472,906	\$1,310,817
TOTAL DAMAGE AND FIRE CONTROL COSTS	\$45,031,225	\$39,000,000 ⁴	\$511,791	\$1,301,912	\$709,359	\$1,620,604

TABLE 1 - SUMMARY OF FOREST-FIRE LOSSES IN CANADA (continued)
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon		Northwest Territories	
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
NUMBER OF FOREST FIRES						
BY SIZE CLASS						
Under $\frac{1}{4}$ acre	2,896	3,596	29	41	17	36
$\frac{1}{4}$ to 10 acres	2,492	2,907	12	28	36	97
11 to 100 acres	646	422	5	11	15	46
101 to 500 acres	223	136	3	9	7	22
Over 500 acres	212	56	10	14	17	47
TOTAL NUMBER OF FIRES	6,469	7,117	59	103	92	248
AREA BURNED BY SIZE CLASS						
Under $\frac{1}{4}$ acre	-	336	-	5	-	1
$\frac{1}{4}$ to 10 acres	-	8,107	-	212	-	277
11 to 100 acres	-	14,724	-	401	-	1,743
101 to 500 acres	-	31,812	-	2,530	-	7,734
Over 500 acres	-	155,471	-	389,900	-	531,186
TOTAL AREA BURNED (acres)	2,050,028	210,450	188,265	393,048	200,630	540,941
AVERAGE FIRE SIZE (acres)	317	30	3,191	3,816	2,181	2,181
AREA UNDER PROTECTION (in sq. miles)	1,254,043	1,389,185	40,000	40,000	89,000	95,000

¹ Includes federal lands within provincial boundaries.

³ Estimated. (Actual expenditures for year 1965:
\$27,940,665)

² Wood values are based on prevailing stumpage rates only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

⁴ Estimated.

TABLE 2 - FOREST FIRES BY CAUSES
Compared with Averages for Previous Five Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-65		Year 1966		Annual Average 1961-65		Year 1966		Annual Average 1961-65		Year 1966	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreation	1,691	24	1,769	25	13	27	13	13	20	17	27	11
Settlement	858	12	879	12	6	13	3	3	3	2	3	1
Woods Operations	234	3	341	5	1	2	-	-	1	1	-	-
Railroads	266	4	419	6	-	-	-	-	-	-	-	-
Other Industries	308	4	358	5	4	8	15	14	12	10	11	5
Incendiaries	321	4	280	4	1	2	-	-	-	-	-	-
Misc. Known	1,146	16	1,177	16	8	17	7	7	8	7	20	8
Unknown	342	5	393	6	5	10	15	14	14	12	52	21
TOTAL MAN CAUSED	5,166	72	5,616	79	38	79	53	51	58	49	113	46
LIGHTNING	2,027	28	1,501	21	10	21	50	49	60	51	135	54
TOTAL	7,193	100	7,117	100	48	100	103	100	118	100	248	100

¹Includes federal lands within provincial boundaries.

TABLE 3 - AREA BURNED BY CAUSES
Compared with Averages for Previous Five Years

Causes	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1961-65		Year 1966		Annual Average 1961-65		Year 1966		Annual Average 1961-65		Year 1966	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Recreation	292,809	12	12,693	6	242	1	138	-	2,558	1	888	-
Settlement	465,564	18	31,069	15	111	-	50	-	3	-	1	-
Woods Operations	160,018	6	12,634	6	1	-	-	-	31	-	-	-
Railroads	7,510	-	1,487	1	-	-	-	-	-	-	-	-
Other Industries	71,017	3	8,286	4	253	1	78	-	2,873	1	14,048	3
Incendiary	37,693	2	5,038	2	-	-	-	-	-	-	-	-
Misc. Known	39,878	2	8,332	4	2	-	1	-	193	-	5,578	1
Unknown	33,927	1	2,421	1	4,173	14	709	-	8,175	3	391,115	72
TOTAL MAN CAUSED	1,108,416	44	81,960	39	4,782	16	976	-	13,833	5	411,630	76
LIGHTNING	1,437,864	56	128,490	61	24,411	84	392,072	100	242,995	95	129,311	24
TOTAL	2,546,280	100	210,450	100	29,193	100	393,048	100	256,828	100	540,941	100

¹Includes federal lands within provincial boundaries.

TABLE 4 - FOREST FIRES BY MONTHS
Compared with 10-Year Average 1956-65

Month	Provinces ¹				Yukon				Northwest Territories			
	Annual Average 1956-65		Year 1966		Annual Average 1956-65		Year 1966		Annual Average 1956-65		Year 1966	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
January	4	-	-	-	-	-	-	-	-	-	-	-
February	3	-	-	-	-	-	-	-	-	-	-	-
March	43	1	41	1	1	2	1	1	-	-	-	-
April	494	8	722	10	2	3	1	1	1	1	-	-
May	1,495	23	1,442	20	9	15	11	10	7	8	8	3
June	1,100	17	1,032	15	15	25	41	40	23	25	120	49
July	1,537	24	1,993	28	15	25	33	32	43	47	60	24
August	1,166	18	1,100	15	12	21	8	8	15	16	54	22
September	337	5	559	8	3	5	8	8	3	3	6	2
October	236	3	214	3	1	2	-	-	-	-	-	-
November	47	1	12	-	-	-	-	-	-	-	-	-
December	7	-	2	-	1	2	-	-	-	-	-	-
TOTAL	6,469	100	7,117	100	59	100	103	100	92	100	248	100

¹ Includes federal lands within provincial boundaries.

TABLE 5 - AREA BURNED BY MONTHS
Compared with Averages for Previous Nine Years

Month	Provinces ¹			Yukon				Northwest Territories			
	Annual Average 1957-65		Year 1966	Annual Average 1957-65		Year 1966	Annual Average 1957-65	Annual Average 1957-65		Year 1966	Per Cent
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent		Acres	Per Cent	Acres	
January	-	-	-	-	-	-	-	-	-	-	-
February	28	-	-	-	-	-	-	-	-	-	-
March	893	-	755	-	-	-	-	-	-	-	-
April	19,369	1	4,231	2	4	-	-	-	-	-	-
May	371,037	18	36,580	17	4,501	2	11	1,542	1	195	-
June	684,376	33	131,870	63	37,971	18	276,876	39,737	19	262,497	49
July	529,848	26	20,254	10	144,412	69	116,019	124,513	58	255,162	47
August	380,193	18	6,649	3	20,613	10	34	47,148	22	22,945	4
September	33,614	2	5,241	3	1,343	1	108	17	-	142	-
October	33,007	2	4,863	2	-	-	-	-	-	-	-
November	1,391	-	4	-	-	-	-	-	-	-	-
December	5	-	3	-	35	-	-	-	-	-	-
TOTAL	2,053,761	100	210,450	100	208,879	100	393,048	212,957	100	540,941	100

¹Includes federal lands within provincial boundaries.

TABLE 6 - LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

Provinces	Proceeding Under Fire Laws						Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions			
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
British Columbia	48.2	31	43.8	26	.91	.84	1.7	0
Alberta	65.5	29	61.1	18	.93	.62	0.3	0
Saskatchewan	10.0	1	9.2	0	.92	.00	0.0	0
Manitoba	8.2	1	7.0	1	.85	1.00	0.2	0
Ontario	48.9	28	43.5	26	.89	.93	0.2	0
Quebec	75.4	92	72.9	92	.97	1.00	0.0	0
New Brunswick	24.2	29	23.2	26	.96	.90	0.1	0
Nova Scotia	10.1	18	10.0	18	.99	1.00	0.0	0
Newfoundland	10.9	8	10.1	7	.93	.88	0.1	0
Yukon	1.5	4	1.4	4	.93	1.00	0.0	0
Northwest Territories	0.9	0	0.6	0	.67	-	0.0	0
Other Federal Lands	0.6	0	0.6	0	1.00	-	0.0	0
TOTAL	304.4	241	283.4	218	.93	.90	2.6	0

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-Year Period 1956-65

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
FIRES										
Total number	2,106	1,967	410	371	263	216	392	235	1,399	1,921
Caused by lightning (per cent)	36.9	19.1	31.2	28.3	41.5	22.2	29.5	33.6	22.9	28.0
AREA BURNED (acres)										
Merchantable timber	65,604	3,505	50,815	12,957	30,275	1,188	169,080	765	137,666	4,470
Young growth	65,853	25,115	44,321	22,885	153,146	25,448	123,025	2,131	14,394	230
Cut-over lands	216,790	2,900	8,991	-	15,083	72	3,701	38	4,112	3,424
Non-forested lands	131,278	23,268	29,561	34,108	199,917	6,493	281,570	3,220	8,716	6,291
TOTAL AREA BURNED (acres)	479,525	54,788	133,688	69,950	398,421	33,201	577,376	6,154	164,888	14,415
Average fire size (acres)	228	28	326	189	1,515	154	1,473	26	118	7
DAMAGE	\$3,620,206	\$ 921,369	\$1,670,503	\$ 554,300	\$ 554,877	\$ 661,895	\$1,050,279	\$ 8,205	\$3,896,755	\$120,979
ACTUAL FIRE- FIGHTING COST	\$1,939,577	\$1,383,400	\$1,133,016	\$2,209,725	\$ 467,588	\$ 477,318	\$ 232,918	\$139,036	\$ 914,887	\$641,663
TOTAL DAMAGE AND ACTUAL FIRE- FIGHTING COST	\$5,559,783	\$2,304,769	\$2,803,519	\$2,764,025	\$1,022,465	\$1,139,213	\$1,283,197	\$147,241	\$4,811,642	\$762,642

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (continued)
Shown with Averages for the 10-Year Period 1956-65

	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
FIRES								
Total number	834	732	362	639	446	817	209	157
Caused by lightning (per cent)	20.3	36.6	8.4	10.0	1.3	1.5	3.9	3.2
AREA BURNED (acres)								
Merchantable timber	35,239	5,153	4,325	600	1,747	81	35,676	14
Young growth	23,719	5,740	3,694	1,310	1,272	227	13,902	47
Cut-over lands	28,993	9,101	2,322	1,031	432	749	12,302	25
Non-forested lands	22,315	457	3,557	1,283	3,974	1,755	94,976	4,187
TOTAL AREA BURNED (acres)	110,266	20,451	13,898	4,224	7,425	2,812	156,856	4,273
Average fire size (acres)	132	28	38	7	17	3	750	27
DAMAGE	\$1,502,789	\$ 413,895	\$191,736	\$ 59,579	\$38,779	\$ 5,158	\$ 974,785	\$ 1,830
ACTUAL FIRE-FIGHTING COST	\$ 796,045	\$ 812,144	\$111,577	\$141,320	\$42,053	\$21,379	\$ 137,762	\$10,400
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$2,298,834	\$1,226,039	\$303,313	\$200,899	\$80,832	\$26,537	\$1,112,547	\$12,230

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (concluded)
Shown with Averages for the 10-Year Period 1956-65

	Federal Lands							
	National Parks		Other Federal Lands		Yukon		Northwest Territories	
	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966	Annual Average 1956-65	Year 1966
FIRES								
Total number	34	33	14	29	59	103	92	248
Caused by lightning (per cent)	24.5	15.1	4.4	10.3	24.3	48.5	47.4	54.6
AREA BURNED (acres)								
Merchantable timber	868	-	72	7	22,520	32,747	52,132	191,033
Young growth	3,408	-	10	4	47,103	76,245	26,385	235,071
Cut-over lands	366	3	14	1	227	-	222	1,292
Non-forested lands	2,586	-	361	167	118,415	284,056	121,891	113,545
TOTAL AREA BURNED (acres)	7,228	3	457	179	188,265	393,048	200,630	540,941
Average fire size (acres)	213	-	33	6	3,191	3,816	2,181	2,181
DAMAGE								
	\$ 9,574	-	\$ 3,049	\$ 18	\$ 236,809	\$ 281,096	\$ 369,971	\$ 941,959
ACTUAL FIRE-FIGHTING COST	\$ 28,326	\$ 1,028	\$ 6,243	\$ 6,825	\$ 53,088	\$ 595,816	\$ 102,935	\$ 368,858
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$ 37,900	\$ 1,028	\$ 9,292	\$ 6,843	\$ 289,897	\$ 876,912	\$ 472,906	\$ 1,310,817

FOREST FIRE LOSSES IN CANADA 1967

by
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FOREST FIRE LOSSES IN CANADA

1967

FOREST FIRE CONTROL personnel generally classify past fire seasons into two broad classes: the "good" years and the "bad" years. Thus, based on fire occurrence alone, the 1967 campaign will undoubtedly be remembered as one of the "bad" years. There was a total of Eight Thousand Four Hundred and Forty-Eight (8,448) forest fires reported in the provinces. In other words, an average of about 40 fires started each day throughout the fire season, with three out of every four fires attributed to human error or carelessness. This year's total even surpasses the unenviable all-time record set during the disastrous 1961 fire season.

It is fortunate that little or no direct relationship exists between number of fires and total area burned. The 8,448 forest fires reported in 1967, represent an increase of almost 26 percent over the corresponding 10-year average. Despite this substantial increase in fire occurrence, the acreage burned was only slightly higher than the annual average with 1,876,612 acres destroyed as compared to an average annual loss of 1,869,430 acres for the 10-year period 1957-66. This year's figure, however, is almost nine times greater than the acreage burned in 1966.

In terms of measurable damage, the 1967 season was second only to 1961. While far below the \$66.9 million destroyed during that disastrous season, the \$17,798,445 in estimated value lost, still exceeds the 10-year average by 44.8 percent or more than \$5.5 million. This year's losses undoubtedly would have been much greater had it not been that 60 percent of the total area burned in the provinces was classified as non-forested. Losses to such areas were assessed at an average minimum value of less than 27 cents per acre. The value of "other property" lost, an item which includes damages to buildings, dams, bridges and other similar improvements, was almost one million dollars or a 54 percent increase over the 10-year average.

Perhaps the most significant feature of the entire 1967 campaign was the large amount spent on direct fire suppression. This year's costs soared to a record \$17,452,385 almost triple the average annual figure. Of course, over the past decade, there has been an upward trend in total expenditures chargeable to individual fires. Generally speaking, the chief reason for the increased cost of fire-fighting has been the greater utilization of both helicopters and fixed-wing aircraft as a fire suppression tool. However, fire control experts generally agree that because of their effectiveness, both as an initial attack tool and as a supplement to ground action, these

same aircraft have played a very important role in helping to minimize the total acreage destroyed annually as a result of forest fires.

Despite the many technological advances made in the field of forest fire protection and the development of aggressive programs of mass-media education, man continues to be his own worst enemy. In 1967, more fires were started as a result of man's negligence than in any other single year on record. Of the 8,448 forest fires reported in the provinces, 6,304 were man-caused. This compares with an annual average of only 5,241 for the previous 10-year period, or an increase of 20 percent. While the percentage associated with each category of man-caused fires was not greatly different from the past yearly-averages, the actual number was higher in every case except for incendiary, miscellaneous known and fires of unknown origin. The increase in numbers of recreation and railroad fires alone, 421 and 487 respectively, accounted for 85 percent of the overall increase in man-caused fires. Fires started by lightning - the only cause not subject to human control - were also up slightly in 1967, although the percentage was down slightly from 27 percent for the 10-year average.

A brief regional review of the 1967 forest fire season shows that fire severity varied considerably from one region to another. In the east, only the provinces of Quebec and Newfoundland reported higher than average losses in terms of numbers of fires, areas burned, and values destroyed. In Newfoundland, less than 700 out of 611,957 acres were burned on the island and according to the Newfoundland Forest Service, most of the losses in Labrador occurred on non-productive lands or on lands of very low quality.* The other eastern provinces experienced a relatively "easy" fire season. The western provinces on the other hand, all experienced a greater than average number of fires while the acreage burned was held below the 10-year average. Three out of four provinces also reported record fire-fighting expenditures: British Columbia spent a "staggering" \$9.3 million to extinguish 3,216 fires, approximately \$3 million was spent in Alberta to suppress 796 fires and it cost Saskatchewan \$1.5 million to put out 418 fires.

Even more tragic, however, than all other forms of losses recorded in 1967, are the many fatalities suffered as a result of forest fire protection activities. A total of 8 deaths were reported across Canada. Three water-bomber pilots and two flying fire-observers were killed in air crashes in British Columbia while three men also lost their lives in Ontario. Only two fatalities were reported on an average over the past ten years.

*It is estimated that less than 10 percent of the gross area burned was productive land.

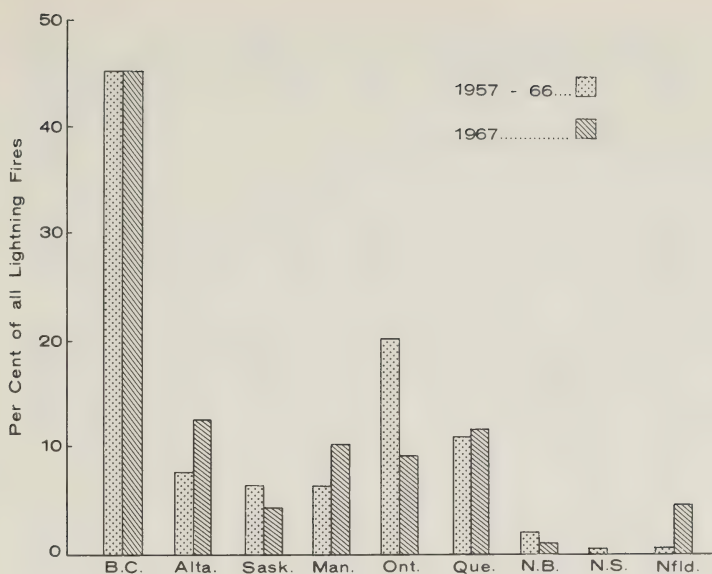


Figure 1. Incidence of lightning fires (Excluding Yukon and N.W.T.)

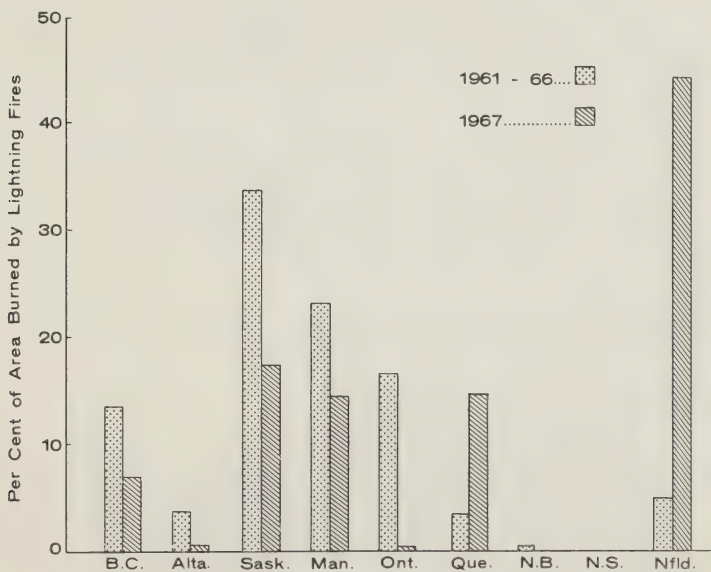


Figure 2. Proportion of area burned by lightning fires (Excluding Yukon and N.W.T.)

TABLE 1 - SUMMARY OF FOREST FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon ²		Northwest Territories	
	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967
TOTAL NUMBER OF FIRES	6,727	8,448	64	73	112	129
AREA BURNED (acres)						
Merchantable timber	469,680	350,992	25,655	39,167	71,131	10,884
Young growth	395,132	318,414	54,662	53,811	48,422	89,370
Cut-over lands	285,373	70,244	224	11,615	351	11,037
Non-forested lands	719,245	1,136,962	146,755	65,242	125,852	54,216
TOTAL AREA BURNED (acres)	1,869,430	1,876,612	227,296	169,835	245,756	165,507
MERCHANTABLE TIMBER BURNED						
Saw timber (M.ft.B.M.)	1,322,601	872,660	4,383	1,190	14,410	20,097
Small material (cords)	1,851,084	2,240,424	199,534	131,701	306,747	113,521
ESTIMATED VALUES DESTROYED ³						
Merchantable timber	\$ 8,179,364	\$10,123,539	\$137,301	\$ 61,145	\$327,875	\$ 56,227
Young growth	2,679,375	5,346,090	99,334	107,624	95,205	108,512
Cut-over lands	425,606	331,882	224	11,615	311	11,037
Non-forested lands	159,602	305,668	8,764	14,500	29,510	13,606
Wood in process	205,888	706,152	-	-	-	-
Other property	637,861	985,114	17,693	5,582	244	3,600
TOTAL DAMAGE	\$12,287,696	\$17,798,445	\$263,316	\$200,466	\$453,145	\$192,982
FIRE CONTROL COSTS						
Actual fire-fighting	\$ 6,107,464	\$17,452,385	\$111,368	\$255,118	\$137,660	\$173,407
Capital, maintenance and overhead	\$26,703,676	\$31,116,398	\$256,597	\$325,000	\$261,850	\$262,669
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$18,395,160	\$35,250,830	\$374,684	\$455,584	\$590,805	\$366,389
TOTAL DAMAGE AND FIRE CONTROL COSTS	\$45,098,836	\$66,367,228	\$631,281	\$780,584	\$852,655	\$629,058

TABLE 1 - SUMMARY OF FOREST FIRE LOSSES IN CANADA (continued)
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon ²		Northwest Territories	
	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967
NUMBER OF FOREST FIRES						
BY SIZE CLASS						
Under $\frac{1}{4}$ acre	3,055	3,928	31	36	20	23
$\frac{1}{4}$ to 10 acres	2,618	3,150	13	15	45	37
11 to 100 acres	644	714	5	7	19	23
101 to 500 acres	217	305	3	3	9	11
Over 500 acres	193	351	12	12	19	35
TOTAL NUMBER OF FIRES	6,727	8,448	64	73	112	129
AREA BURNED BY SIZE CLASS						
Under $\frac{1}{4}$ acre	-	382	-	5	-	8
$\frac{1}{4}$ to 10 acres	-	10,489	-	43	-	377
11 to 100 acres	-	27,483	-	326	-	1,490
101 to 500 acres	-	73,362	-	861	-	9,565
Over 500 acres	-	1,764,896	-	168,600	-	154,067
TOTAL AREA BURNED (acres)	1,869,430	1,876,612	227,296	169,835	245,756	165,507
AVERAGE FIRE SIZE (acres)	278	222	3,574	2,326	2,194	1,283
AREA UNDER PROTECTION (in sq. miles)	1,281,052	1,410,675	40,000	56,400	89,000	95,000

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zone.

³Wood values are based on prevailing stumpage rates only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

TABLE 2 - FOREST FIRES BY CAUSES
Compared with Averages for Previous Six Years

Causes	Provinces ¹				Yukon ²				Northwest Territories			
	Annual Average 1961-66		Year 1967		Annual Average 1961-66		Year 1967		Annual Average 1961-66		Year 1967	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreation	1,704	24	2,125	25	13	23	15	20	21	15	17	13
Settlement	861	12	1,013	12	6	10	8	11	3	2	7	5
Woods Operations	252	4	388	5	1	2	-	-	1	1	-	-
Railroads	292	4	779	9	-	-	-	-	-	-	-	-
Other Industries	317	4	377	5	6	10	1	1	12	9	7	5
Incendiary	314	4	287	3	1	2	-	-	-	-	3	2
Misc. Known	1,151	16	1,028	12	7	12	18	25	10	7	1	1
Unknown	350	5	307	4	7	12	10	14	20	14	38	30
TOTAL MAN CAUSED	5,241	73	6,304	75	41	71	52	71	67	48	73	56
Lightning	1,939	27	2,144	25	16	29	21	29	73	52	56	44
TOTAL	7,180	100	8,448	100	57	100	73	100	140	100	129	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zone.

TABLE 3 - AREA BURNED BY CAUSES
Compared with Averages for Previous Six Years

Causes	Provinces ¹				Yukon ²				Northwest Territories			
	Annual Average 1961-66		Year 1967		Annual Average 1961-66		Year 1967		Annual Average 1961-67		Year 1967	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Recreation	246,123	11	91,885	5	225	-	84	-	2,280	1	130	-
Settlement	393,148	18	155,505	8	101	-	4	-	3	-	10	-
Woods Operations	135,454	6	71,251	4	1	-	-	-	26	-	-	-
Railroads	6,506	-	15,201	1	-	-	-	-	-	-	-	-
Other Industries	60,562	3	59,754	3	224	-	1	-	4,735	1	10,963	7
Incendiary	32,250	2	54,244	3	-	-	-	-	-	-	2	-
Misc. Known	34,621	2	46,316	2	2	-	39	-	1,090	-	12,201	7
Unknown	28,676	1	14,768	1	3,595	4	23,025	14	71,999	24	31,200	19
TOTAL MAN CAUSED	937,340	43	508,924	27	4,148	4	23,153	14	80,133	26	54,506	33
Lightning	1,219,635	57	1,367,688	73	85,688	96	146,682	86	224,047	74	111,001	67
TOTAL	2,156,975	100	1,876,612	100	89,836	100	169,835	100	304,180	100	165,507	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zone.

TABLE 4 - FOREST FIRES BY MONTHS
Compared with 10-Year Average 1957-66

Month	Provinces ¹			Yukon ²			Northwest Territories		
	Annual Average 1957-66		Year 1967	Annual Average 1957-66		Year 1967	Annual Average 1957-66		Year 1967
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number
January	4	-	3	-	-	-	-	-	-
February	3	-	-	-	-	-	-	-	-
March	45	1	8	-	-	-	-	-	-
April	551	8	342	4	2	3	-	-	-
May	1,514	22	1,351	16	9	14	6	8	1
June	1,124	17	1,977	23	18	28	30	34	34
July	1,649	25	1,635	19	17	26	14	46	39
August	1,196	18	1,960	23	12	19	11	20	18
September	361	5	983	12	4	6	9	4	8
October	230	3	135	2	1	2	3	-	-
November	43	1	33	1	-	-	-	-	-
December	7	-	21	-	1	2	-	-	-
TOTAL	6,727	100	8,448	100	64	100	73	112	100
									100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zone.

TABLE 5 - AREA BURNED BY MONTHS
Compared with 10-Year Average 1957-66

Month	Provinces ¹				Yukon ²				Northwest Territories			
	Annual Average 1957-66		Year 1967		Annual Average 1957-66		Year 1967		Annual Average 1957-66		Year 1967	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
January	-	-	-	-	-	-	-	-	-	-	-	-
February	25	-	-	-	-	-	-	-	-	-	-	-
March	880	-	125	-	-	-	-	-	-	-	-	-
April	17,855	1	2,257	-	3	-	-	-	-	-	-	-
May	337,591	18	124,818	7	4,052	2	1	-	1,407	1	62	-
June	629,125	34	973,042	52	61,861	27	147,059	87	62,013	25	122,155	74
July	478,889	25	117,793	6	141,573	62	22,710	13	137,578	56	35,166	21
August	342,839	18	459,518	24	18,555	8	61	-	44,728	18	6,628	4
September	30,777	2	197,931	11	1,220	1	3	-	30	-	1,496	1
October	30,192	2	1,110	-	-	-	1	-	-	-	-	-
November	1,253	-	10	-	-	-	-	-	-	-	-	-
December	4	-	8	-	32	-	-	-	-	-	-	-
TOTAL	1,869,430	100	1,876,612	100	227,296	100	169,835	100	245,756	100	165,507	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zone.

TABLE 6 - LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

Province	Proceedings Under Fire Laws						Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions			
	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967
British Columbia	40.8	77	36.5	68	.89	.88	1.2	5
Alberta	60.8	42	56.3	39	.93	.93	0.2	0
Saskatchewan	9.1	8	8.2	8	.90	1.00	0.0	0
Manitoba	8.2	13	7.0	13	.85	1.00	0.2	0
Ontario	45.5	33	40.5	29	.89	.88	0.2	3
Quebec	79.7	66	77.2	66	.97	1.00	0.0	0
New Brunswick	25.4	5	24.1	5	.95	1.00	0.1	0
Nova Scotia	11.7	2	11.6	1	.99	.50	0.0	0
Newfoundland	11.6	8	10.7	7	.92	.88	0.1	0
Yukon	1.9	3	1.8	3	.95	1.00	0.0	0
Northwest Territories	0.2	0	0.2	0	1.00	-	0.0	0
Other Federal Lands	0.6	0	0.6	0	1.00	-	0.0	0
TOTAL	295.5	257	274.7	239	.93	.93	2.0	8

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-Year Period 1957-66

Item	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967
FIRES										
Total number	2,117	3,216	422	796	266	418	381	638	1,489	1,465
Caused by lightning (per cent)	36.1	29.8	31.8	33.9	40.3	23.4	28.8	34.0	23.1	13.5
AREA BURNED (acres)										
Merchantable timber	62,037	67,464	25,025	6,513	30,040	29,697	148,568	80,642	127,593	32,902
Young growth	63,863	67,579	18,385	6,925	151,940	113,530	109,752	25,860	5,001	898
Cut-over lands	212,677	29,760	6,521	-	14,966	553	3,675	1,827	2,598	21,958
Non-forested lands	99,462	79,680	21,304	9,777	198,924	177,236	262,866	213,767	8,516	7,744
TOTAL AREA BURNED (acres)	438,039	244,483	71,235	23,215	395,870	321,016	524,861	322,096	143,708	63,502
Average fire size (acres)	207	76	169	29	1,489	768	1,379	505	96	43
DAMAGE										
	\$3,569,215	\$ 5,679,120	\$ 829,206	\$ 307,524	\$ 615,456	\$1,931,857	\$ 937,817	\$394,090	\$3,599,806	\$1,353,919
ACTUAL FIRE- FIGHTING COST										
	\$2,029,003	\$ 9,308,740	\$1,295,556	\$3,001,635	\$ 508,320	\$1,494,193	\$ 237,973	\$513,511	\$ 859,034	\$1,424,811
TOTAL DAMAGE AND ACTUAL FIRE- FIGHTING COST										
	\$5,598,218	\$14,987,860	\$2,124,762	\$3,309,159	\$1,123,776	\$3,426,050	\$1,175,790	\$907,601	\$4,458,840	\$2,778,730

TABLE - 7 STATISTICS OF FOREST FIRES BY REGIONS (continued)
Shown with Averages for the 10-Year Period 1957-66

Item	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967
FIRES								
Total number	869	939	411	311	509	318	214	264
Caused by lightning (per cent)	21.6	26.7	8.4	7.4	1.4	0.3	4.0	39.8
AREA BURNED (acres)								
Merchantable timber	33,672	82,084	4,377	149	1,753	2,382	35,678	48,402
Young growth	23,807	97,359	3,810	4,123	1,267	2,002	13,891	138
Cut-over lands	29,562	15,436	2,401	146	491	453	12,113	110
Non-forested lands	22,247	74,308	3,550	471	4,103	931	95,311	563,307
TOTAL AREA BURNED (acres)	109,288	269,187	14,138	4,889	7,614	5,768	156,993	611,957
Average fire size (acres)	126	287	34	16	15	18	733	2,318
DAMAGE	\$1,517,595	\$6,815,623	\$197,271	\$ 61,658	\$34,143	\$ 35,660	\$ 974,655	\$1,211,015
ACTUAL FIRE-FIGHTING COST	\$ 835,521	\$1,007,022	\$125,429	\$ 86,300	\$43,838	\$ 94,600	\$ 138,773	\$ 495,641
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$2,353,116	\$7,822,645	\$322,700	\$147,958	\$77,981	\$130,260	\$1,113,428	\$1,706,656

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (concluded)
Shown with Averages for the 10-Year Period 1957-66

Item	Federal Lands							
	National Parks		Other Federal Lands		Yukon ¹		Northwest Territories	
	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967	Annual Average 1957-66	Year 1967
FIRES								
Total number	34	71	15	12	64	73	112	129
Caused by lightning (per cent)	23.1	32.4	5.8	0.0	29.9	28.8	49.0	43.4
AREA BURNED (acres)								
Merchantable timber	865	665	72	92	25,655	39,167	71,131	10,884
Young growth	3,406	-	10	-	54,662	53,811	48,422	89,370
Cut-over lands	355	-	14	1	224	11,615	351	11,037
Non-forested lands	2,585	9,689	377	52	146,755	65,242	125,852	54,216
TOTAL AREA BURNED (acres)	7,211	10,354	473	145	227,296	169,835	245,756	165,507
Average fire size (acres)	211	146	31	12	3,574	2,326	2,194	1,283
DAMAGE								
	\$ 9,492	\$ 7,682	\$ 3,040	\$ 297	\$ 263,316	\$ 200,466	\$ 453,145	\$ 192,982
ACTUAL FIRE-FIGHTING COST	\$ 27,151	\$ 22,400	\$ 6,866	\$ 3,532	\$ 111,368	\$ 255,118	\$ 137,660	\$ 173,407
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$ 36,643	\$ 30,082	\$ 9,906	\$ 3,829	\$ 374,684	\$ 455,584	\$ 590,805	\$ 366,389

¹ Includes only forest fire losses within the protected zone.

FOREST FIRE LOSSES IN CANADA 1968

by
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FOREST FIRE LOSSES IN CANADA

1968

INTRODUCTION

Those who have used this publication in the past may note that beginning with the current issue, some changes have been introduced in the treatment of the statistical data. While these changes are of a minor nature, it is hoped that the new approach will help increase the usefulness of our annual publication.

The first modification involves figures for the Yukon and Northwest Territories in Tables 1 to 5 inclusive. Although listed separately in the past, forest fire statistics for both federal territories have now been combined in order that national statistics may be shown. This will allow the reader a better overall appreciation of the total fire problem. It will still be possible nevertheless to relate fire experience in any given region to that in other areas of the country. A slightly different approach was also adopted in illustrating the lightning fire problem. Figures 1 and 2 were modified in order to portray the regional lightning fire problem in relation to the total fire load within each region rather than as a percentage of the national lightning fire total as had been the custom in the past.

BRIEF REVIEW OF 1968 FOREST FIRE SEASON

Whatever criteria are selected, one must conclude that the 1968 forest fire season was a relatively severe one. First, the number of forest fires reported was slightly higher than the corresponding ten-year average (7,301 compared to 7,195). Secondly, some 900 million cubic feet of merchantable-size timber were destroyed. This figure surpasses by about 80% the annual average volume lost over the ten-year period 1958-67. Thirdly, the total estimated monetary damages to forest lands, including that to other property, reached \$21,604,794, an increase of some 47% over the average losses for the previous decade. Finally, forest fire suppression costs were up 50% from an annual average of \$7,938,772 to \$11,896,326 in 1968.

It is particularly apparent, however, from the regional breakdown of forest fire losses (Table 7) that the 1968 fire season was by no means equally severe in all parts of Canada. While three of the four western provinces experienced generally favourable conditions the province of Alberta was faced with its worst fire season on record insofar as area burned was concerned. In the east a similar situation prevailed with only

the Province of Quebec reporting a generally worse-than-average fire year. Not only was the number of fires substantially greater than the ten-year average but the acreage burned almost tripled the annual average and the values lost were about double the corresponding figure for the period 1958-67. By comparison, losses were much below average both in Ontario and Newfoundland. Despite the relatively severe fire weather conditions which prevailed throughout most of the fire season and the exceptionally large number of forest fires reported, losses were about normal in New Brunswick and Nova Scotia.

Although records show that a period of bad fire weather generally occurs in at least some part of the country each year, often accounting for a substantial portion of the total annual acreage burned, seldom have such extensive losses been reported during the first few months of the fire season as in 1968. Lack of precipitation during the period between the disappearance of the winter's snow and the growth of new summer vegetation resulted in an unusually severe outbreak of fires. A total of 3,253 forest fires were reported in the provinces during the months of April and May accounting for 46% of the annual total. Corresponding figures for the 1958-67 decade show that fire occurrence averaged only about 2,000 fires or 28% of the total. Insofar as acreage burned is concerned, some 1,328,000 acres of forest land or 82% of the annual total were ravaged by fire during that same period. By comparison, the average loss over the previous ten years amounted to only about 355,000 acres or 18% of the annual average. While fire occurrence reached a second peak during July and August, generally cool weather conditions accompanied by greater than normal amounts of precipitation throughout practically all of Canada resulted in considerably below-average acreage burned.

It should be borne in mind that acreage burned is, like the occurrence of forest fires, dependent not only on climatic and fuel conditions but also on the activities of fire-starting agencies in that a sudden rash of forest fires could result in an emergency situation beyond the normal capabilities of any fire control organization. The most dramatic evidence of the importance of fire-starting agents may be found in the statistics for the province of Alberta. With cool dry weather conditions prevailing throughout most of the province during the month of May (Edmonton reported its driest May since observations were first recorded in 1881) the havoc wrought by the 306 forest fires reported resulted in a record 986,877 acres of forest land destroyed, 702,560 acres of which were attributed to a number of large fires started by settlers burning brush.

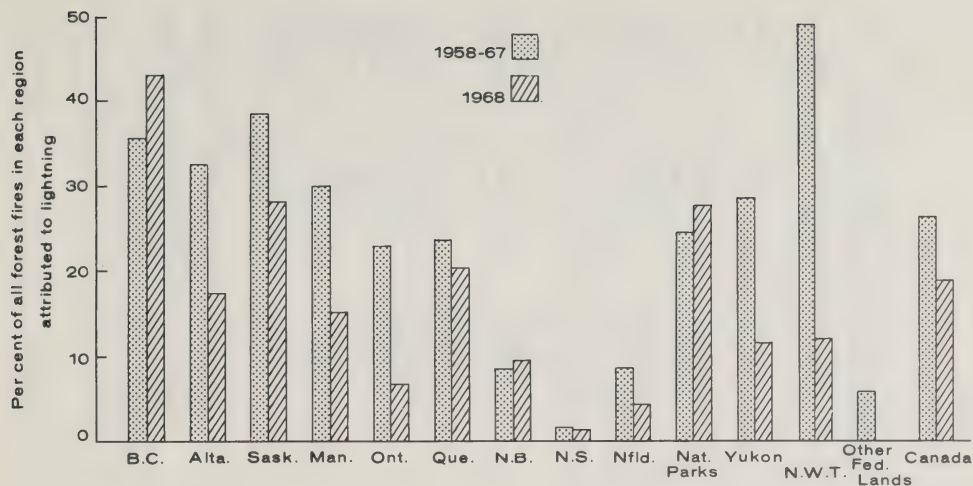


Figure 1. Incidence of lightning fires by region.

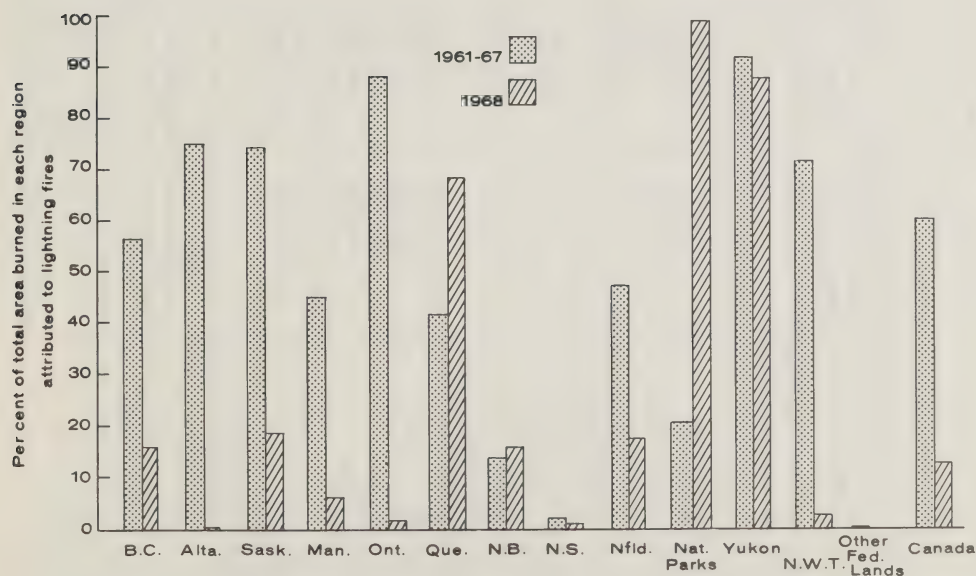


Figure 2. Proportion of area burned by lightning fires by region.

TABLE 1 - SUMMARY OF FOREST FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon & Northwest Territories ²		Canada - Total	
	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968
TOTAL NUMBER OF FIRES	7,012	7,107	183	194	7,195	7,301
AREA BURNED (acres)						
Merchantable timber	497,632	516,971	100,367	30,254	597,999	547,225
Young growth	418,146	194,251	115,948	170,936	534,094	365,187
Cut-over lands	283,828	162,299	2,790	6,533	286,618	168,832
Non-forested lands	812,244	752,512	242,391	377,849	1,054,635	1,130,361
TOTAL AREA BURNED (acres)	2,011,850	1,626,033	461,496	585,572	2,473,346	2,211,605
MERCHANTABLE TIMBER BURNED ³						
Saw timber (M.Ft.B.M.)	1,407,303	657,566	20,914	7,012	1,428,217	664,578
Small material (cords)	2,031,326	8,783,166	528,184	241,065	2,559,510	9,024,231
ESTIMATED VALUES DESTROYED ⁴						
Merchantable timber	\$ 9,116,142	\$17,264,655	\$ 474,984	\$ 127,544	\$ 9,591,126	\$17,392,199
Young growth	3,188,116	1,607,326	213,245	341,872	3,401,361	1,949,198
Cut-over lands	450,574	271,587	2,749	6,533	453,323	278,120
Non-forested lands	181,181	62,910	32,740	93,909	213,921	156,819
Wood in process	284,264	298,372	-	-	284,264	298,372
Other property	699,220	528,756	18,805	1,001,330	718,025	1,530,086
TOTAL DAMAGE	\$13,919,497	\$20,033,606	\$ 742,523	\$1,571,188	\$14,662,020	\$21,604,794
FIRE CONTROL COSTS						
Actual fire-fighting	\$ 7,652,395	\$11,591,369	\$ 286,377	\$ 304,957	\$ 7,938,772	\$11,896,326
Capital, maintenance and overhead	\$27,468,864	\$32,647,633	\$ 549,676	\$ 579,786	\$28,018,540	\$33,227,419
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$21,571,892	\$31,624,975	\$1,028,900	\$1,876,145	\$22,600,792	\$33,501,120
TOTAL DAMAGE AND FIRE CONTROL COSTS	\$49,040,756	\$64,272,608	\$1,578,576	\$2,455,931	\$50,619,332	\$66,728,539

TABLE 1 - SUMMARY OF FOREST FIRE LOSSES IN CANADA (concluded)
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon & Northwest Territories ²		Canada - Total	
	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968
NUMBER OF FOREST FIRES BY SIZE CLASS						
Under $\frac{1}{4}$ acre	3,229	3,408	53	81	3,282	3,489
$\frac{1}{4}$ to 10 acres	2,696	2,722	59	58	2,755	2,780
11 to 100 acres	644	599	26	21	670	620
101 to 500 acres	226	222	13	13	239	235
Over 500 acres	217	156	32	21	249	177
TOTAL NUMBER OF FIRES	7,012	7,107	183	194	7,195	7,301
AREA BURNED BY SIZE CLASS						
Under $\frac{1}{4}$ acre	-	239	-	6	-	245
$\frac{1}{4}$ to 10 acres	-	8,335	-	139	-	8,474
11 to 100 acres	-	20,957	-	904	-	21,861
101 to 500 acres	-	49,196	-	3,507	-	52,703
Over 500 acres	-	1,547,306	-	581,016	-	2,128,322
TOTAL AREA BURNED (acres)	2,011,850	1,626,033	461,496	585,572	2,473,346	2,211,605
AVERAGE FIRE SIZE (acres)	287	229	2,522	3,018	344	303
AREA UNDER PROTECTION (in sq. miles)	1,300,746	1,464,953	131,640	155,000	1,432,386	1,619,953

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

³Merchantable timber volumes burned during the 1968 fire season in Ontario are not available.

⁴Wood values are based on prevailing stumpage rates only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

TABLE 2 - FOREST FIRES BY CAUSES
Compared with Averages for Previous Seven Years

Causes	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1961-67		Year 1968		Annual Average 1961-67		Year 1968		Annual Average 1961-67		Year 1968	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreation	1,764	24	1,462	20	34	17	49	25	1,798	24	1,511	21
Settlement	883	12	913	13	10	5	11	6	893	12	924	13
Woods Operations	272	4	333	5	1	1	2	1	273	4	335	4
Railroads	361	5	406	6	-	-	1	-	361	5	407	6
Other Industries	325	4	289	4	16	8	12	6	341	4	301	4
Incendiary	310	4	459	6	1	1	4	2	311	4	463	6
Misc. Known	1,065	14	1,411	20	18	9	19	10	1,083	14	1,430	20
Unknown	413	6	473	7	30	15	73	38	443	6	546	7
TOTAL MAN CAUSED	5,393	73	5,746	81	110	56	171	88	5,503	73	5,917	81
Lightning	1,968	27	1,361	19	87	44	23	12	2,055	27	1,384	19
TOTAL	7,361	100	7,107	100	197	100	194	100	7,558	100	7,301	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 3 - AREA BURNED BY CAUSES
Compared with Averages for Previous Seven Years

Causes	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1961-67		Year 1968		Annual Average 1961-67		Year 1968		Annual Average 1961-67		Year 1968	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Recreation	224,089	10	272,560	17	2,177	1	95,364	16	226,266	9	367,924	17
Settlement	359,199	17	738,356	46	91	-	2	-	359,290	14	738,358	33
Woods Operations	126,282	6	38,778	2	22	-	240	-	126,304	5	39,018	2
Railroads	7,748	-	5,252	-	-	-	-	-	7,748	-	5,252	-
Other Industries	60,446	3	131,491	8	5,817	1	481	-	66,263	3	131,972	6
Incendiary	35,392	2	86,393	5	1	-	10	-	35,393	1	86,403	4
Misc. Known	34,574	2	51,092	3	2,685	1	29	-	37,259	2	51,121	2
Unknown	28,407	1	24,191	2	72,542	19	460,237	79	100,949	4	484,428	22
TOTAL MAN CAUSED	876,137	41	1,348,113	83	83,335	22	556,363	95	959,472	38	1,904,476	86
Lightning	1,240,786	59	277,920	17	302,299	78	29,209	5	1,542,085	62	307,129	14
TOTAL	2,116,923	100	1,626,033	100	385,634	100	585,572	100	2,502,557	100	2,211,605	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 4 - FOREST FIRES BY MONTHS
Compared with 10-Year Average 1958-67

Month	Provinces ¹						Yukon & Northwest Territories ²						Canada - Total			
	Annual Average 1958-67			Year 1968			Annual Average 1958-67			Year 1968			Annual Average 1958-67		Year 1968	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
January	3	-	11	-	-	-	-	-	1	1	3	-	12	-	-	-
February	3	-	9	-	-	-	-	-	-	-	3	-	9	-	-	-
March	43	1	67	1	-	-	-	-	1	1	43	1	68	1	1	1
April	529	7	1,084	15	2	1	2	1	12	6	531	7	1,096	15	15	15
May	1,473	21	2,169	31	16	9	16	9	32	16	1,489	21	2,201	30	30	30
June	1,250	18	725	10	56	30	56	30	33	17	1,306	18	758	10	10	10
July	1,731	25	1,265	18	69	38	69	38	49	25	1,800	25	1,314	18	18	18
August	1,284	18	1,271	18	30	16	30	16	60	31	1,314	18	1,331	18	18	18
September	425	6	344	5	8	4	8	4	6	3	433	6	350	5	5	5
October	217	3	131	2	1	1	1	1	-	-	218	3	131	2	2	2
November	45	1	24	-	1	1	1	1	-	-	46	1	24	-	-	-
December	9	-	7	-	-	-	-	-	-	-	9	-	7	-	-	-
TOTAL	7,012	100	7,107	100	183	100	183	100	194	100	7,195	100	7,301	100	100	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 5 - AREA BURNED BY MONTHS
Compared with 10-Year Average 1958-67

Month	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1958-67		Year 1968		Annual Average 1958-67		Year 1968		Annual Average 1958-67		Year 1968	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
January	-	-	13	-	-	-	192	-	-	-	205	-
February	25	-	62	-	-	-	-	-	25	-	62	-
March	884	-	1,067	-	-	-	-	-	884	-	1,067	-
April	17,108	1	43,145	3	3	-	2	-	17,111	1	43,147	2
May	337,999	17	1,284,806	79	5,462	1	328	-	343,461	14	1,285,134	58
June	710,083	35	145,174	9	149,497	32	40,500	7	859,580	35	185,674	9
July	488,160	24	135,696	8	279,411	61	23,297	4	767,571	31	158,993	7
August	384,519	19	14,868	1	26,740	6	521,250	89	411,259	16	536,118	24
September	50,121	3	755	-	383	-	3	-	50,504	2	758	-
October	21,693	1	350	-	-	-	-	-	21,693	1	350	-
November	1,253	-	85	-	-	-	-	-	1,253	-	85	-
December	5	-	12	-	-	-	-	-	5	-	12	-
TOTAL	2,011,850	100	1,626,033	100	461,496	100	585,572	100	2,473,346	100	2,211,605	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 6 - LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

Provinces	Proceedings Under Fire Laws						Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions			
	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968
British Columbia	44.1	14	39.3	13	.89	.93	1.7	2
Alberta	58.8	53	54.1	50	.92	.94	0.2	0
Saskatchewan	8.0	8	7.1	8	.89	1.00	0.0	0
Manitoba	9.4	0	8.3	0	.88	-	0.2	0
Ontario	43.3	41	39.3	36	.91	.88	0.5	0
Quebec	81.4	31	78.9	27	.97	.87	0.0	0
New Brunswick	23.5	21	22.2	20	.94	.95	0.1	0
Nova Scotia	11.0	0	10.8	0	.98	-	0.0	0
Newfoundland	12.2	20	11.2	16	.92	.80	0.1	0
Yukon	2.0	6	1.9	6	.95	1.00	0.0	0
Northwest Territories	0.2	0	0.2	0	1.00	-	0.0	0
Other Federal Lands	0.5	0	0.5	0	1.00	-	0.0	0
TOTAL	294.4	194	273.8	176	.93	.91	2.8	2

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS

Shown with Averages for the 10-Year Period 1958-67

Item	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968
FIRES Total number Caused by light- ning (per cent)	2,314	1,647	483	617	292	349	410	231	1,469	1,219
	35.8	43.0	32.6	17.5	38.4	28.1	30.0	15.1	22.9	6.5
AREA BURNED (acres) Merchantable timber Young growth Cut-over lands Non-forested lands	68,602	2,727	25,554	388,022	32,434	26,237	152,837	5,973	129,799	2,704
	70,197	8,541	18,108	34,132	162,880	82,846	109,912	7,736	3,804	183
	209,735	2,680	6,442	105,636	15,010	2,131	3,780	21,838	4,548	791
	107,281	19,433	21,904	461,585	212,869	66,279	274,818	12,435	7,242	5,783
TOTAL AREA BURNED (acres)	455,815	33,381	72,008	989,375	423,193	177,493	541,347	47,982	145,393	9,461
Average fire size (acres)	197	20	149	1,604	1,449	509	1,320	208	99	8
DAMAGE	\$4,111,804	\$ 679,273	\$ 847,640	\$13,651,425	\$ 804,906	\$ 919,673	\$ 960,289	\$ 79,421	\$3,677,517	\$ 54,146
ACTUAL FIRE- FIGHTING COST	\$2,942,586	\$1,590,756	\$1,581,595	\$ 5,970,410	\$ 644,801	\$1,568,905	\$ 278,870	\$244,395	\$ 907,557	\$316,887
TOTAL DAMAGE AND ACTUAL FIRE- FIGHTING COST	\$7,054,390	\$2,270,029	\$2,429,235	\$19,621,835	\$1,449,707	\$2,488,578	\$1,239,159	\$323,816	\$4,585,074	\$371,033

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (continued)
Shown with Averages for the 10-Year Period 1958-67

Item	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968
FIRES								
Total number	877	1,164	414	73.1	486	920	214	166
Caused by lightning (per cent)	23.5	20.2	8.3	9.4	1.4	1.3	8.7	4.2
AREA BURNED (acres)								
Merchantable timber	41,144	85,265	4,372	3,262	1,421	1,758	40,494	988
Young growth	30,674	47,565	4,177	1,765	1,184	2,713	13,796	2,498
Cut-over lands	29,160	18,188	2,270	1,695	503	946	12,011	8,359
Non-forested lands	28,051	173,521	3,342	1,014	3,905	2,359	148,989	9,824
TOTAL AREA BURNED (acres)	129,029	324,539	14,161	7,736	7,013	7,776	215,290	21,669
Average fire size (acres)	147	279	34	11	14	8	1,006	131
DAMAGE								
ACTUAL FIRE-FIGHTING COST	\$2,185,783	\$4,182,777	\$201,124	\$196,353	\$27,660	\$ 35,395	\$1,089,564	\$233,285
	\$ 910,603	\$1,178,937	\$132,242	\$328,552	\$49,798	\$103,879	\$ 169,041	\$113,261
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$3,096,386	\$5,361,714	\$333,366	\$524,905	\$77,458	\$139,274	\$1,258,605	\$346,546

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (concluded)
Shown with Averages for the 10-Year Period 1958-67

Item	Federal Lands							
	National Parks		Other Federal Lands		Yukon ¹		Northwest Territories ¹	
	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968	Annual Average 1958-67	Year 1968
FIRES								
Total number	38	36	15	27	62	77	121	117
Caused by lightning (per cent)	24.5	27.8	5.8	0.0	28.5	11.7	49.1	12.0
AREA BURNED (acres)								
Merchantable timber	895	-	80	35	28,182	1,957	72,185	28,297
Young growth	3,404	6,258	10	14	58,592	8,805	57,356	162,131
Cut-over lands	355	-	14	35	1,385	-	1,405	6,533
Non-forested lands	3,461	1	382	278	144,496	7,858	97,895	369,991
TOTAL AREA BURNED (acres)	8,115	6,259	486	362	232,655	18,620	228,841	566,952
Average fire size (acres)	214	174	32	13	3,752	242	1,891	4,846
DAMAGE								
	\$10,158	-	\$ 3,052	\$1,858	\$278,690	\$ 23,278	\$463,833	\$1,547,910
ACTUAL FIRE-FIGHTING COST	\$28,191	\$169,014	\$ 7,111	\$6,373	\$134,447	\$172,244	\$151,930	\$ 132,713
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$38,349	\$169,014	\$10,163	\$8,231	\$413,137	\$195,522	\$615,763	\$1,680,623

¹Includes only forest fire losses within the protected zones.

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Publications

FOREST FIRE LOSSES IN CANADA 1969

by
M. R. Lockman



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FOREST FIRE LOSSES IN CANADA 1969

For the second consecutive year, the number of forest fires reported in Canada was substantially below the near record established in 1967. There were a total of 6,633 fire starts in 1969 compared with 7,301 in 1968 and 8,650 the previous year. But, despite a 23% reduction in fire incidence over the past 2 years, there has not been a corresponding decrease in total acreage burned. In fact the 2,331,378 acres of forest land destroyed by fire in 1969 is not only greater than that reported in either 1967 or 1968 it also exceeds the corresponding 10 year average by some 130,000 acres.

The Yukon and Northwest Territories experienced by far the most severe fire season of any region in Canada accounting for 1,593,861 acres or 68% of the total acreage burnt. The two federal territories also reported an additional 850,000 acres destroyed in the non-protected northern zones. These zones which basically include areas of low timber, aesthetic, wildlife and/or watershed values do not receive the same degree of protection afforded other areas of the North.

Nevertheless, it should not be construed that protection of the forest from fire is not given serious consideration in the North. In 1969, some \$54.80 per capita was spent there on forest fire control (including \$37.70 per capita on actual fire suppression). By comparison, in the provinces, where the forest resources have a much more important economic impact, a total of only \$2.22 per person (including \$0.52 per person for fire suppression) was spent for the same purpose.

REGIONAL FOREST FIRE SEVERITY

While combined statistics point to a generally mild fire season in the provinces in 1969 with a total of 6,391 fires destroying only 737,517 acres of forest land (90% and 40% respectively of the corresponding

10 year averages) bad fire years still occur much too commonly in Canada. Indeed, most Canadian provinces during the past half century have had their sad-to-contemplate records of one-million-or-more-acres fire years. In the 1920's, both the provinces of Quebec and Ontario reported losses of over one million acres. In the 1930's the provinces of Quebec, Ontario, Saskatchewan and Alberta were among that select group. During that same decade British Columbia also experienced a somewhat disastrous year with some 994,979 acres burnt in 1931. There were four one-million-acres fire years in the 1940's. Alberta accounted for two while Quebec and Ontario reported one each. Meanwhile, in 1948, Forest Protection personnel in Manitoba succeeded in holding their acreage loss to slightly less than the one-million-acre mark (973,486 acres). The next decade was marred by a 2,065,423-acre loss in British Columbia in 1958. Finally, the 1960's proved to be the most disastrous decade of the half century. In 1961, one million or more acres were reported burned over by fires in the provinces of British Columbia, Saskatchewan, Manitoba, Ontario and Newfoundland; the latter reaching that plateau for the first time since joining Confederation in 1949. In addition, British Columbia and Saskatchewan reported their second disastrous year of the decade in 1964 and 1967 respectively.

The only prolonged severe fire hazard period of the 1969 season in the provinces occurred in British Columbia. A ridge of high pressure which developed off the West Coast brought generally hot dry conditions to most of the province during June. This high pressure ridge eliminated most of the normal June rains resulting in a rash of forest fires which damaged almost 300,000 acres of forest land or 80% of the month's total for all provinces. Despite the heavy losses reported in June, the total acreage burned in British Columbia in 1969 was only about 60% above the corresponding ten-year average 1959-1968 (406,763 compared to 252,610 acres). But the record low losses reported in the central and Atlantic regions perhaps best illustrates the effects of regional differences in forest fire season severity. With over four times the protected area and about seven times the population, the five provinces east of the Ontario-Manitoba border (P.E.I. not included) were responsible for only some 400 more fires than British Columbia. Even more significant, however, are the comparative statistics for acreage burned and actual fire fighting

costs. Indeed, total losses reported in each of those two categories in eastern Canada were only 9 and 23% respectively of those incurred in British Columbia.

FOREST FIRE CAUSES

The number and percentage of forest fires ascribed to each of the ten general causes recognized in Canada are shown in Table 2. While the percentage associated with each known cause for 1969 agrees closely with the corresponding figures for the past eight years, the actual number is generally lower except for railroad and woods operations fires which show an increase of 30% and 52% respectively.

Although a relatively small proportion of the total number of forest fires is attributed to woods operations, this cause is potentially very dangerous. For those who had doubts regarding the importance of woodlands operations as a cause of fire, the following figures are very revealing. Of the nine general categories of man-caused forest fires (lightning excluded), forestry activities ranked third or better in terms of acres burned for six out of the last nine years - second only to recreation fires in both 1962 and 1965. Even more significant, however, are figures for those woods operations fires which are specifically attributed to the use of power saws. In its annual report for the year 1966, the Laurentian Forest Protective Association noted that power saw fires burned some 10,240 acres (61% of total area burned) and cost \$270,570 to extinguish (71% of total fire fighting cost).

Over the years, considerable attention has been given to the railroad fire problem in Canada. As a result of specifically oriented fire prevention activities, the number of railroad fires dropped from a peak of 838 in 1944 to slightly over 200 in 1962. Statistics for the past few years, however, indicate that an unjustifiably large number of forest fires are again being ascribed to railway operations. This single cause accounted for 779 forest fires in 1967 alone. The annual average for the last four years (520) was more than double the corresponding figure (251) for the previous four-year period.

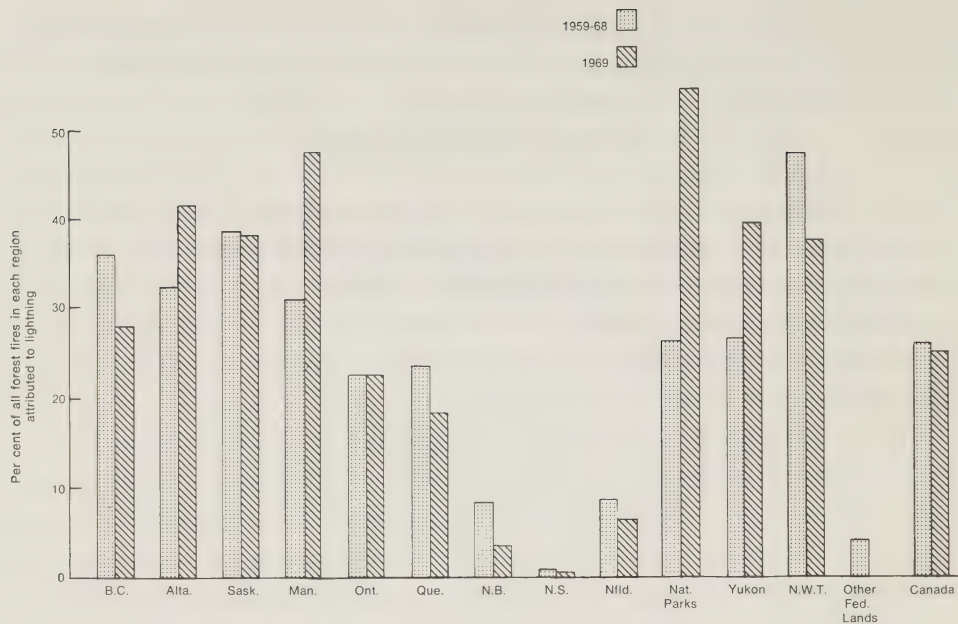


Figure 1. Incidence of lightning fires by region.

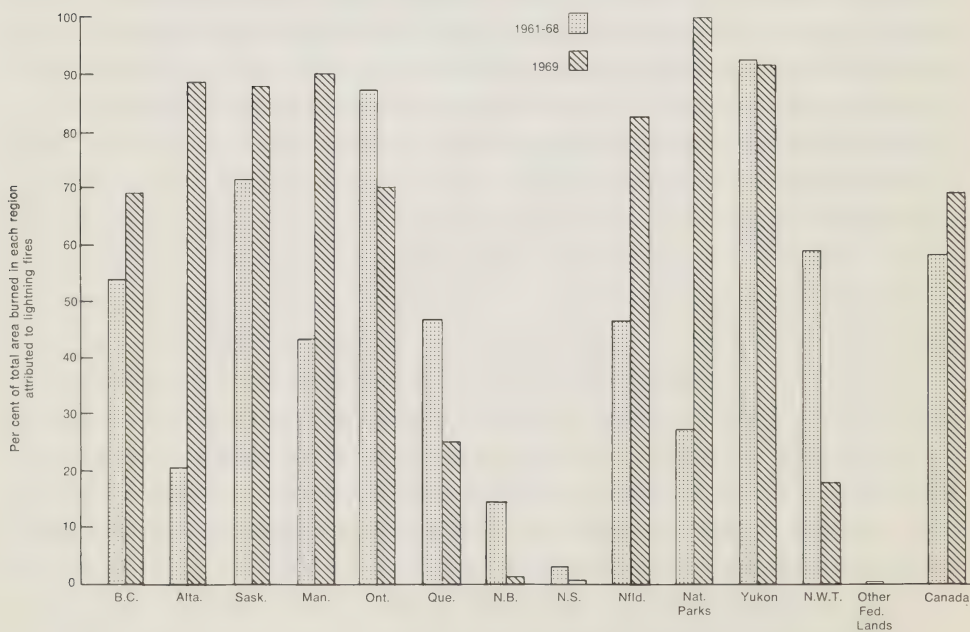


Figure 2. Proportion of area burned by lightning fires by region.

Nevertheless it should be noted that the importance of this cause of forest fires varies considerably from one region to another. Over the past 7 years, four out of every ten railway fires occurred in British Columbia or about eight times the proportion in the Prairie provinces. The central region (Quebec and Ontario) accounted for 30% of the national total whereas one out of every four railroad-caused forest fires reported occurred in the Atlantic provinces.

TABLE 1 - SUMMARY OF FOREST FIRE LOSSES IN CANADA
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon & Northwest Territories ²		Canada - Total	
	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969
TOTAL NUMBER OF FIRES	7,058	6,391	185	242	7,243	6,633
AREA BURNED (acres)						
Merchantable timber	495,207	138,222	84,361	231,340	579,568	369,562
Young growth	397,153	252,323	92,646	926,314	489,799	1,178,637
Cut-over lands	134,344	30,923	3,427	13,014	137,771	43,937
Non-forested lands	818,594	316,049	175,649	423,193	994,243	739,242
TOTAL AREA BURNED (acres)	1,845,298	737,517	356,083	1,593,861	2,201,381	2,331,378
MERCHANTABLE TIMBER BURNED						
Saw timber (M.Ft.B.M.)	1,245,596	142,870	21,465	307,645	1,267,061	450,515
Small material (cords)	2,746,640	489,272	469,497	1,083,930	3,216,137	1,573,202
ESTIMATED VALUES DESTROYED ³						
Merchantable timber	\$10,210,614	\$ 6,723,581	\$ 373,532	\$ 834,278	\$10,584,146	\$ 7,557,859
Young growth	2,895,630	3,266,197	169,921	1,854,736	3,065,551	5,120,933
Cut-over lands	397,031	65,432	3,386	15,268	400,417	80,700
Non-forested lands	187,312	56,221	40,294	112,230	227,606	168,451
Wood in process	314,101	448,167	-	-	314,101	448,167
Other property	688,666	421,573	104,708	36,000	793,374	457,573
TOTAL DAMAGE	\$14,693,354	\$10,981,171	\$ 691,841	\$2,852,512	\$15,385,195	\$13,833,683
FIRE CONTROL COSTS						
Actual fire-fighting	\$ 8,031,790	\$10,449,593	\$ 294,757	\$1,625,825	\$ 8,326,547	\$12,075,418
Capital, maintenance and overhead	\$28,165,464	\$33,839,811	\$ 568,890	\$ 780,309	\$28,734,354	\$34,620,120
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$22,725,144	\$21,430,764	\$ 986,598	\$4,478,337	\$23,711,742	\$25,909,101
TOTAL DAMAGE AND FIRE CONTROL COSTS	\$50,890,608	\$55,270,575	\$1,555,488	\$5,258,646	\$52,446,096	\$60,529,221

TABLE 1 - SUMMARY OF FOREST FIRE LOSSES IN CANADA (concluded)
Compared with Averages for Previous Ten Years

Item	Provinces ¹		Yukon & Northwest Territories ²		Canada - Total	
	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969
NUMBER OF FOREST FIRES						
BY SIZE CLASS						
Under $\frac{1}{4}$ acre	3,289	3,252	55	80	3,344	3,332
$\frac{1}{4}$ to 10 acres	2,716	2,456	60	56	2,776	2,512
11 to 100 acres	626	429	27	25	653	454
101 to 500 acres	226	141	13	23	239	164
Over 500 acres	201	113	30	58	231	171
TOTAL NUMBER OF FIRES	7,058	6,391	185	242	7,243	6,633
AREA BURNED BY SIZE CLASS						
Under $\frac{1}{4}$ acre	-	247	-	6	-	253
$\frac{1}{4}$ to 10 acres	-	7,726	-	207	-	7,933
11 to 100 acres	-	15,992	-	910	-	16,902
101 to 500 acres	-	35,617	-	5,746	-	41,363
Over 500 acres	-	677,935	-	1,586,992	-	2,264,927
TOTAL AREA BURNED (acres)	1,845,298	737,517	356,083	1,593,861	2,201,381	2,331,378
AVERAGE FIRE SIZE (acres)	261	115	1,925	6,586	304	351
AREA UNDER PROTECTION (in sq. miles)	1,325,118	1,380,565	139,700	155,000	1,464,818	1,535,565

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

³Wood values are based on prevailing stumpage rates only; damages to soil, site quality, stream flow regulation, wildlife, recreational and similar values are not included.

TABLE 2 - FOREST FIRES BY CAUSES
Compared with Averages for Previous Eight Years

Causes	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1961-68		Year 1969		Annual Average 1961-68		Year 1969		Annual Average 1961-68		Year 1969	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreation	1,726	24	1,302	20	36	18	43	18	1,762	23	1,345	20
Settlement	887	12	666	10	10	5	7	3	897	12	673	10
Woods Operations	279	4	426	7	1	1	1	0	280	4	427	7
Railroads	367	5	476	7	1	1	1	0	368	5	477	7
Other Industries	321	4	255	4	16	8	19	8	337	5	274	4
Incendiary	329	4	268	4	1	1	4	2	330	4	272	4
Misc. Known	1,168	16	960	15	18	9	27	11	1,186	16	987	15
Unknown	360	5	473	8	35	17	47	20	395	5	520	8
TOTAL MAN CAUSED	5,437	74	4,826	75	118	60	149	62	5,555	74	4,975	75
Lightning	1,892	26	1,565	25	79	40	93	38	1,971	26	1,658	25
TOTAL	7,329	100	6,391	100	197	100	242	100	7,526	100	6,633	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 3 - AREA BURNED BY CAUSES
Compared with Averages for Previous Eight Years

Causes	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1961-68		Year 1969		Annual Average 1961-68		Year 1969		Annual Average 1961-68		Year 1969	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Recreation	230,148	11	28,574	4	13,825	3	6,030	0	243,973	10	34,604	2
Settlement	406,594	20	69,526	9	80	0	6	0	406,674	16	69,532	3
Woods Operations	115,344	6	23,768	3	50	0	0	0	115,394	5	23,768	1
Railroads	7,436	0	2,877	0	0	0	2	0	7,436	0	2,879	0
Other Industries	69,327	3	11,243	2	5,150	1	381,317	24	74,477	3	392,560	17
Incendiary	41,767	2	6,381	1	2	0	5	0	41,769	2	6,386	0
Misc. Known	38,141	2	24,012	3	2,353	1	44	0	40,494	2	24,056	1
Unknown	26,377	1	3,567	1	121,003	30	251,385	16	147,380	6	254,952	11
TOTAL MAN CAUSED	935,134	45	169,948	23	142,463	35	638,789	40	1,077,597	44	808,737	35
Lightning	1,120,427	55	567,569	77	268,163	65	955,072	60	1,388,590	56	1,522,641	65
TOTAL	2,055,561	100	737,517	100	410,626	100	1,593,861	100	2,466,187	100	2,331,378	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 4 - FOREST FIRES BY MONTHS
Compared with 10-Year Average 1959-68

Month	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1959-68		Year 1969		Annual Average 1959-68		Year 1969		Annual Average 1959-68		Year 1969	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
January	4	0	10	0	0	0	0	0	4	0	10	0
February	4	0	5	0	0	0	0	0	4	0	5	0
March	44	1	39	1	0	0	0	0	44	1	39	1
April	561	8	492	8	3	2	1	0	564	8	493	7
May	1,521	22	1,297	20	17	9	33	14	1,538	21	1,330	20
June	1,235	17	1,415	22	53	29	111	46	1,288	18	1,526	23
July	1,722	24	1,454	23	68	37	55	23	1,790	25	1,509	23
August	1,264	18	1,229	19	35	19	32	13	1,299	18	1,261	19
September	435	6	349	6	8	4	9	4	443	6	358	6
October	218	3	91	1	1	0	1	0	219	3	92	1
November	42	1	8	0	0	0	0	0	42	0	8	0
December	8	0	2	0	0	0	0	0	8	0	2	0
TOTAL	7,058	100	6,391	100	185	100	242	100	7,243	100	6,633	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 5 - AREA BURNED BY MONTHS
Compared with 10-Year Average 1959-68

Month	Provinces ¹				Yukon & Northwest Territories ²				Canada - Total			
	Annual Average 1959-68		Year 1969		Annual Average 1959-68		Year 1969		Annual Average 1959-68		Year 1969	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
January	1	0	2	0	19	0	0	0	20	0	2	0
February	31	0	13	0	0	0	0	0	31	0	13	0
March	890	0	533	0	0	0	0	0	890	0	533	0
April	17,839	1	4,864	1	2	0	12	0	17,841	1	4,876	1
May	370,602	20	49,361	7	3,123	1	51,745	3	373,725	17	101,106	7
June	701,404	38	368,283	50	122,524	34	1,406,213	88	823,928	37	1,774,496	50
July	419,243	23	140,698	19	163,271	46	88,278	6	582,514	26	228,976	19
August	276,949	15	158,491	21	66,761	19	39,111	2	343,710	16	197,602	21
September	36,498	2	14,565	2	383	0	8,500	1	36,881	2	23,065	2
October	20,599	1	616	0	0	0	2	0	20,599	1	618	0
November	1,237	0	90	0	0	0	0	0	1,237	0	90	0
December	5	0	1	0	0	0	0	0	5	0	1	0
TOTAL	1,845,298	100	737,517	100	356,083	100	1,593,861	100	2,201,381	100	2,331,378	100

¹Includes federal lands within provincial boundaries.

²Includes only forest fire losses within the protected zones.

TABLE 6 - LEGAL ACTIONS AND FATALITIES
Comparative Statements by Regions

Provinces	Proceedings Under Fire Laws						Number of Fatalities	
	Number of Prosecutions		Number of Convictions		Ratio of Convictions to Prosecutions			
	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969
British Columbia	33.1	21	29.1	19	.88	.90	1.3	0
Alberta	50.1	51	45.8	46	.91	.90	0.0	0
Saskatchewan	7.1	27	6.3	24	.89	.89	0.0	0
Manitoba	7.6	1	6.6	1	.87	1.00	0.2	0
Ontario	40.3	19	36.7	16	.91	.84	0.5	0
Quebec	77.9	59	75.7	56	.97	.95	0.0	0
New Brunswick	23.9	6	22.6	6	.94	1.00	0.0	0
Nova Scotia	11.0	14	10.8	13	.98	.93	0.0	0
Newfoundland	14.2	45	12.8	40	.90	.89	0.1	0
Yukon	2.4	2	2.3	2	.96	1.00	0.0	0
Northwest Territories	0.1	0	0.1	0	1.00	-	0.0	0
Other Federal Lands	0.5	0	0.5	0	1.00	-	0.0	0
TOTAL	268.2	245	249.3	223	.93	.91	2.1	0

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS
Shown with Averages for the 10-Year Period 1959-68

Item	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969
FIRES Total number Caused by light- ning (per cent)	2,173	2,318	498	548	302	398	395	326	1,435	901
	36.1	27.9	32.2	41.4	38.7	37.9	31.0	47.5	22.4	22.4
AREA BURNED (acres) Merchantable timber Young growth Cut-over lands Non-forested lands	42,048	87,202	55,186	29,791	34,837	2,435	136,368	14,080	129,408	3,959
	56,475	90,622	15,173	9,349	169,138	139,274	95,552	2,076	1,800	273
	46,113	21,662	17,000	5,242	14,827	470	5,198	64	4,539	374
	107,974	207,277	60,487	27,769	210,214	11,600	226,873	45,018	6,927	1,528
TOTAL AREA BURNED (acres)	252,610	406,763	147,846	72,151	429,016	153,779	463,991	61,238	142,674	6,134
Average fire size (acres)	116	175	297	132	1,421	386	1,175	188	99	7
DAMAGE ACTUAL FIRE- FIGHTING COST	\$3,347,189	\$ 7,439,197	\$1,942,030	\$2,165,801	\$ 888,566	\$ 877,603	\$ 895,705	\$142,606	\$3,642,078	\$130,133
	\$2,610,295	\$ 4,352,050	\$2,018,503	\$3,291,234	\$ 775,420	\$1,109,374	\$ 288,213	\$289,181	\$ 865,687	\$614,000
TOTAL DAMAGE AND ACTUAL FIRE- FIGHTING COST	\$5,957,484	\$11,791,247	\$3,960,533	\$5,457,035	\$1,663,986	\$1,986,977	\$1,183,918	\$431,787	\$4,507,765	\$744,133

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (Continued)
Shown with Averages for the 10-Year Period 1959-68

Item	Quebec		New Brunswick		Nova Scotia		Newfoundland	
	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969
FIRES								
Total number	955	609	473	417	553	623	218	153
Caused by Lightning (per cent)	23.5	18.2	8.5	3.4	1.5	0.5	8.8	6.5
AREA BURNED (acres)								
Merchantable timber	49,636	196	4,591	496	1,591	46	40,593	4
Young growth	35,322	573	4,208	579	1,417	559	14,032	1,305
Cut-over lands	30,530	1,951	2,365	880	587	261	12,845	18
Non-forested lands	45,305	591	3,225	669	4,066	1,947	149,726	18,824
TOTAL AREA BURNED (acres)	160,793	3,311	14,389	2,624	7,661	2,813	217,196	20,151
Average fire size (acres)	168	5	30	6	14	5	996	132
DAMAGE	\$2,603,058	\$138,982	\$217,796	\$ 74,078	\$30,734	\$ 5,718	\$1,112,862	\$ 6,670
ACTUAL FIRE-FIGHTING COST	\$1,019,319	\$214,955	\$162,591	\$ 97,299	\$59,654	\$47,233	\$ 180,170	\$ 19,542
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$3,622,377	\$353,937	\$380,387	\$171,377	\$90,388	\$52,951	\$1,293,032	\$26,212

TABLE 7 - STATISTICS OF FOREST FIRES BY REGIONS (concluded)
Shown with Averages for the 10-Year Period 1959-68

Item	Federal Lands						
	National Parks		Other Federal Lands		Yukon ¹		Northwest Territories ¹
	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	Annual Average 1959-68	Year 1969	
FIRES							
Total number	38	85	18	13	60	111	125
Caused by lightning (per cent)	26.3	54.1	4.5	0.0	26.7	39.6	47.7
AREA BURNED (acres)							
Merchantable timber	866	0	83	13	10,268	200,887	74,093
Young growth	4,025	7,713	11	0	19,338	333,820	73,308
Cut-over lands	322	0	18	1	1,370	2,258	2,057
Non-forested lands	3,388	219	409	607	48,100	373,011	127,549
TOTAL AREA BURNED (acres)	8,601	7,932	521	621	79,076	909,976	277,007
Average fire size (acres)	226	93	29	48	1,318	8,198	2,216
DAMAGE							
ACTUAL FIRE-FIGHTING COST	\$10,098	0	\$ 3,238	\$ 383	\$130,864	\$1,392,874	\$560,977
	\$44,214	\$411,837	\$ 7,724	\$2,888	\$132,589	\$1,252,251	\$162,168
TOTAL DAMAGE AND ACTUAL FIRE-FIGHTING COST	\$54,312	\$411,837	\$10,962	\$3,271	\$263,453	\$2,645,125	\$723,145
							\$1,833,212

¹Includes only forest fire losses within the protected zones.

